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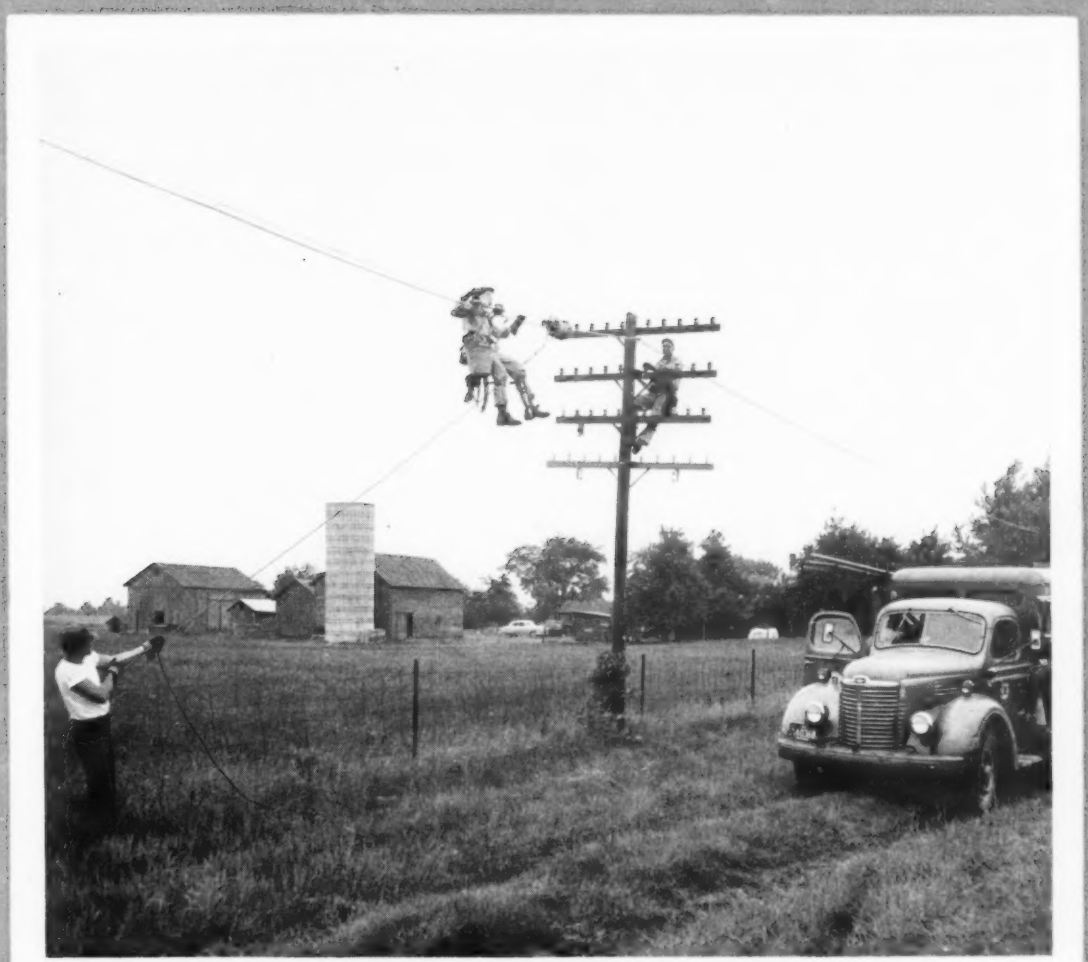
OCTOBER 13, 1956
VOL. 151—NO. 15

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY



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Guaranteed Circulation This Issue
11,541 of Which 10,862 is Paid

CABLE SPINNING

Groundman Arthur Richardson, Apprentice Lineman James Lehman and Head Lineman Zeno Nix (left to right) of the Home Telephone & Telegraph Co. of Fort Wayne, Indiana, spinning cable.

MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING

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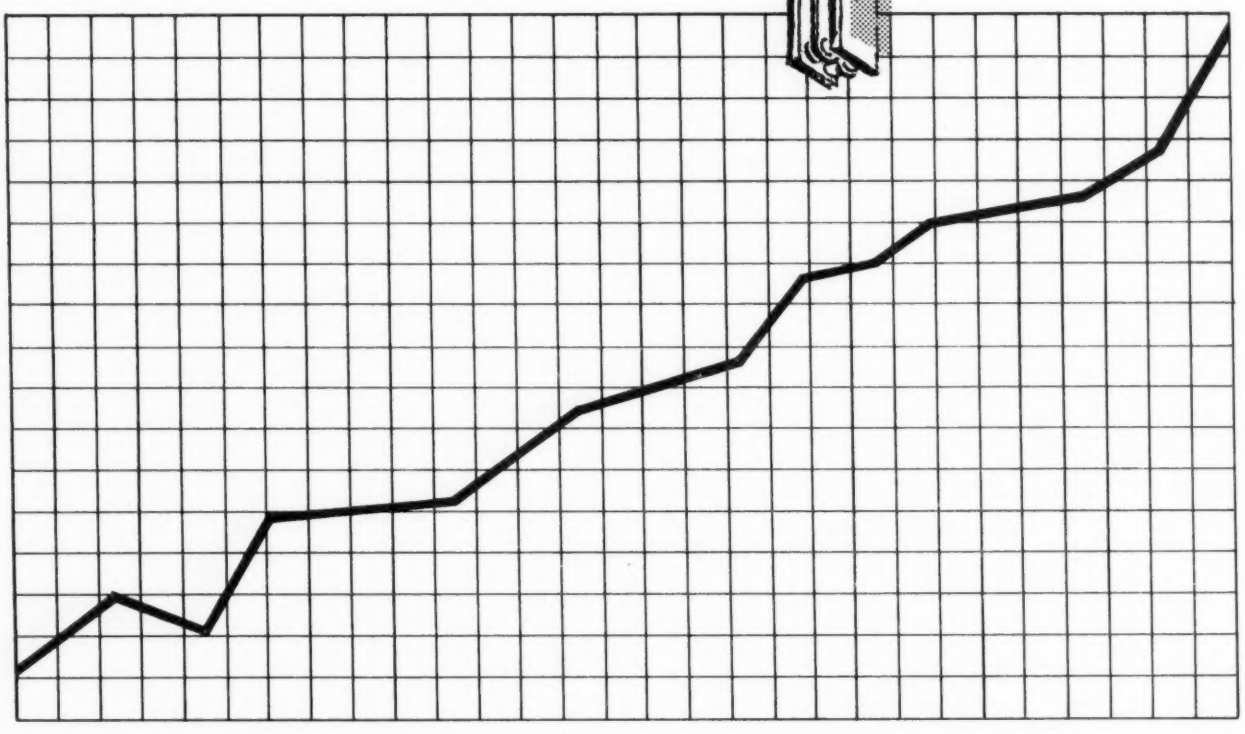
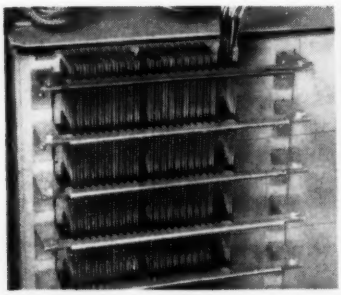
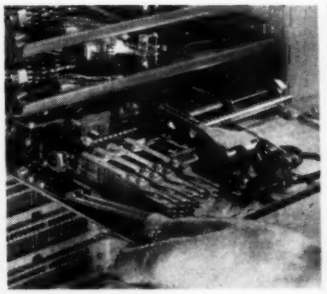
2×1=22.7

Like to fit this

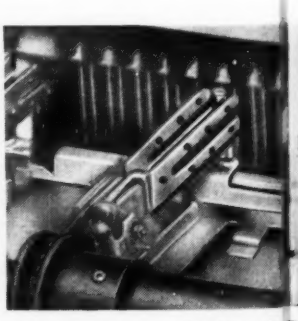




Vertical multiple wire bank units of nickel silver wire are part of every XY Dial System. They stay dust-free.



Famous XY Universal Switch slips into position as a finder, selector or connector in seconds, without alterations.



Wipers have twin contacts for more effective operation . . . last years without replacement

Equ
bac
ing
and
inex

is equation into your profit chart?

No matter how busy your central office operation may be, you get positive insurance of reliable operation and long life with *welded* twin contacts of precious metal—*22.7 times as reliable* as single contacts.

This money-saving feature is only one of many profitable advantages you enjoy with XY® dial equipment. For example:

Switch wipers have twin contacts for positive action and are designed to last for years and years . . . without replacement.

The renowned XY Universal Switch can be used as a *finder*, *selector* or *connector*—without alterations. It's easy to install, remove, adjust or clean.

Vertical multiple wire bank units save cleaning costs because *dust doesn't collect on the wires.* And you save on maintenance because dust-free wires insure noise-free circuits day in and day out.

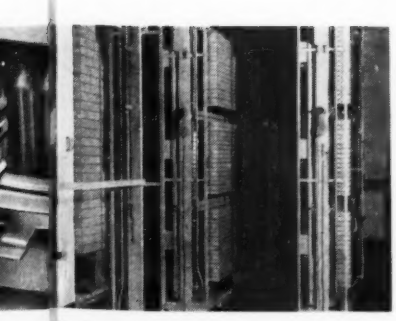
Back-to-back rack mounting *saves costly floor space in building or expanding your exchange* . . . provides easy servicing and expansion of the system, while saving hundreds of dollars in building and space costs.

Your nearest Stromberg-Carlson representative will be glad to show you in full detail how profitably an XY System will fit into your dial plans.

STROMBERG-CARLSON COMPANY

A DIVISION OF GENERAL DYNAMICS CORPORATION

Sales Offices: Atlanta 6, Chicago 6, Kansas City 8, Rochester 3, San Francisco



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ement

Equipment racks are mounted back to back to save costly floor space in building or expanding exchange. Servicing and expansion of system are easy and inexpensive.

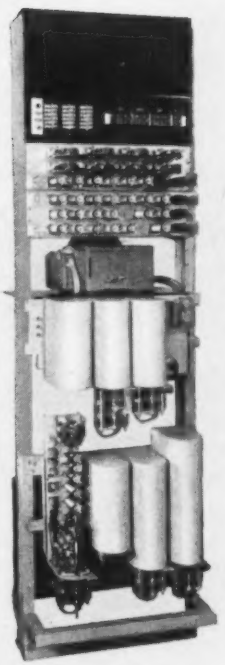
Kellogg offers

a toll ticketing system that is

- Most economical system available.
- Automatically records all information for billing.
- More compact.

XUM

automatic, compact, economical



Make network toll calls profitable and prepare for nationwide direct distance dialing with this practical, compact, Federal Automatic Ticketing System . . . priced within the range of every independent telephone company. The simple easy-to-service elements of the system include:

THE ROUTING SELECTOR, a standard step-by-step switch which is reached by dialing a prefix. It will automatically choose a toll trunk that is not busy.

THE SCANNER AND THE CLOCK, which record automatically on punched tape all the information that is needed in billing a subscriber.

Where routing selection is not required a "ticketing repeater" is available with complete recording features.

Why not start to plan your automatic ticketing now? For further information ask your Kellogg Representative or write:

KELLOGG
A DIVISION OF I T & T

KELLOGG SWITCHBOARD AND SUPPLY COMPANY

A Division of International Telephone and Telegraph Corporation

Sales Offices: 79 W. Monroe St., Chicago 3, Ill.

KELLOGG Branch Warehouses and Offices:

6000 W. 51st Street
Chicago 38, Illinois
REliance 5-5445

4501 Truman Road
Kansas City 1, Missouri
Humboldt 7085

410 N. Syndicate Avenue
St. Paul 4, Minnesota
Nestor 5878

1515 Turtle Creek Blvd.
Dallas 2, Texas
Prospect 5191

1663 Mission Street
San Francisco 3, California
Market 1-6011

1555 West Fourth Street
Mansfield, Ohio
Mansfield 7-2816

1594 Southland Circle, N.W.
Atlanta, Georgia
Sycamore 4-2441

Export Distributor:
International Standard
Electric Corp.
50 Church Street
New York 7, N. Y.

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IT TAKES ONLY *15 SECONDS* TO

This box contains a relay bar. This relay bar is the only equipment you need to add ten lines to a Leich Dial System.

Here it is — ready to be jacked in to your Leich Dial System. No wiring or soldering.

Imagine this! It will cost you ONLY $175.00 to add ten lines to your Leich Dial System. It will take but 15 seconds to jack in this single, inexpensive relay bar which does the job. There's no wiring, no soldering, no engineering, no factory installers needed.

Check — see the time, trouble and expense involved in adding ten lines to other more complicated dial switchboards. Then call us — get the full story on why over 800 Leich Dial Systems are now in service.

Get the Leich story today.

LEICH ma

LEICH SALES CORPORATION, 427 WEST RANDOLPH STREET, CHICAGO 6, ILLINOIS PACI

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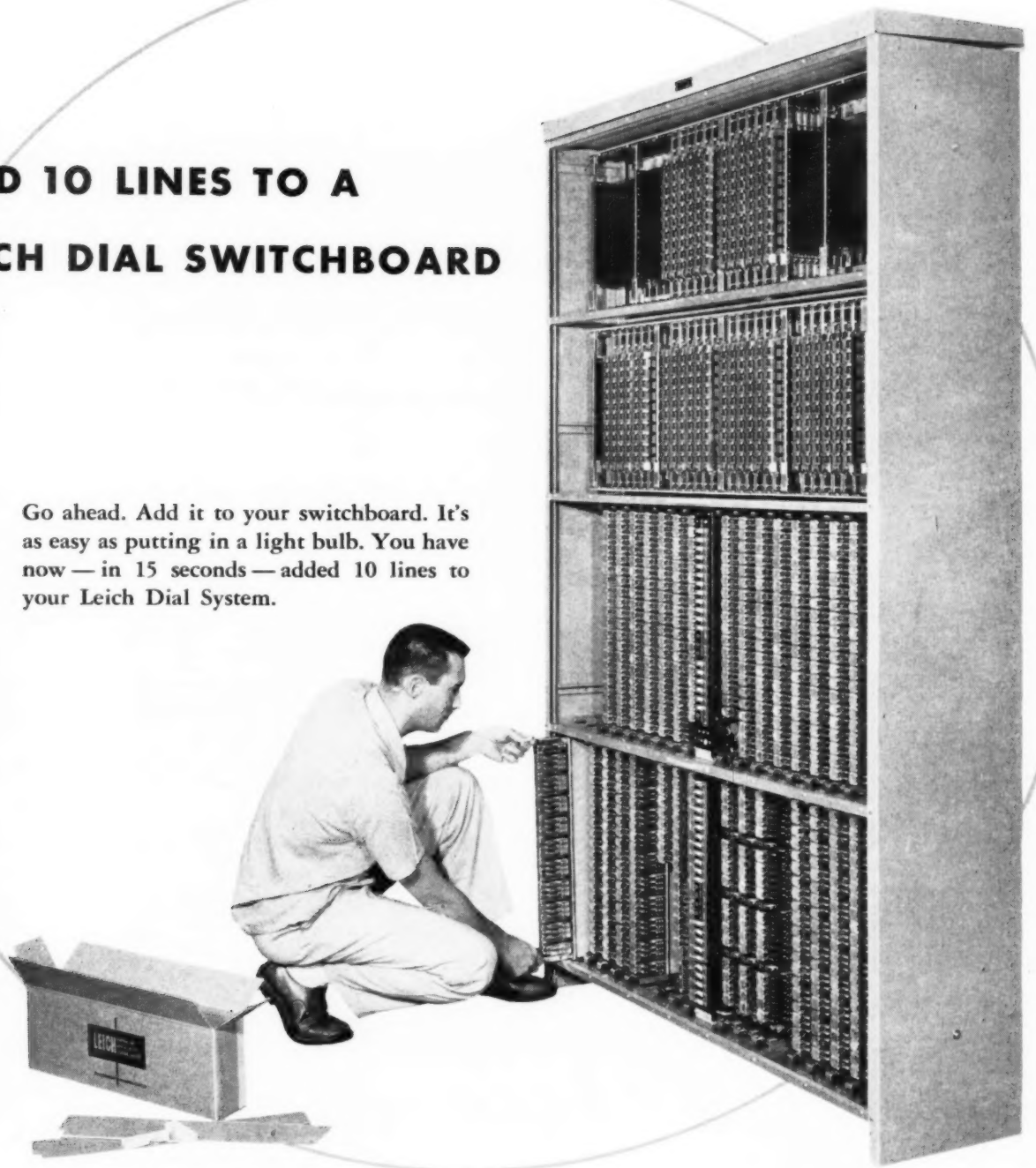
TO ADD 10 LINES TO A LEICH DIAL SWITCHBOARD

Go ahead. Add it to your switchboard. It's as easy as putting in a light bulb. You have now — in 15 seconds — added 10 lines to your Leich Dial System.



manufacturers of telephones, switchboards and related apparatus since 1907

PACIFIC COAST: 11401 WEST PICO BLVD., LOS ANGELES 64, CALIFORNIA

SOUTHWEST: 1227 SLOCUM STREET, DALLAS 7, TEXAS

WESTERN UTILITIES CORPORATION

300 MONTGOMERY STREET • SAN FRANCISCO, CALIFORNIA

announces the purchase of

THE THORNHILL PUBLISHING COMPANY

Publishers of Telephone Directories

The Thornhill Company will operate as a Division of Western Utilities Corporation offering to the telephone industry . . .

Complete Telephone Directory Service

including advertising sales, copy and layout counsel for advertisers, photo-engraving, paging, printing of both "Classified" and "Alphabetical" sections.

Experienced Management

George B. Thornhill, Vice President and General Manager of The Thornhill Publishing Company, has had 16 years experience in telephone directory publishing plus several years in advertising, printing, photoengraving, and allied industries. The Thornhill Company now publishes 127 directories in nine western states.

Three Offices

For information regarding Thornhill Directories write or telephone the Thornhill office nearest you.

202 E. Anderson St.
Brownwood, Texas
Telephone: LD 11

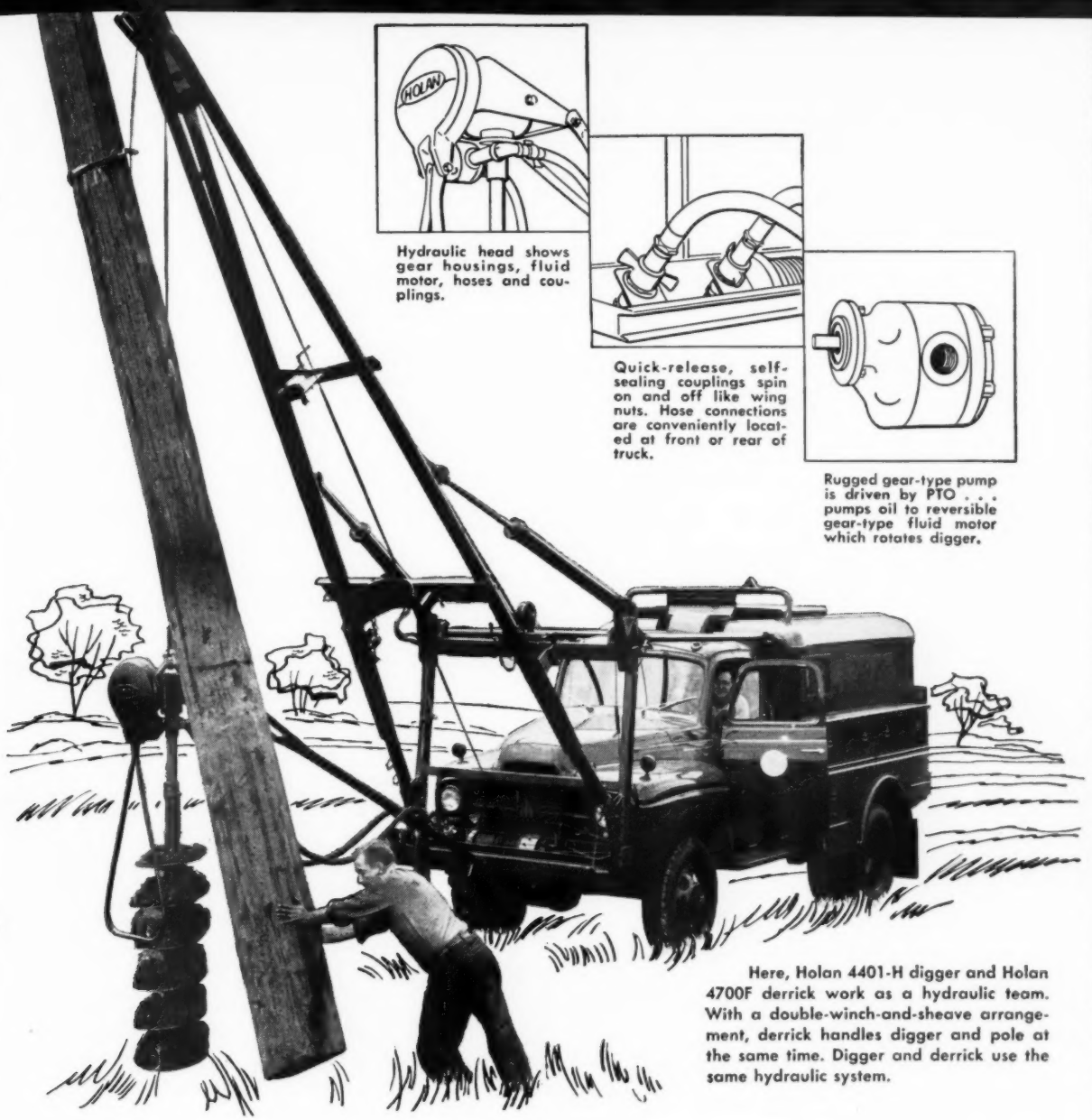
300 Montgomery St.
San Francisco, Calif.
Telephone: GArfield 1-4826

1712 Hewitt Ave.
Everett, Wash.
Telephone: Bayview 4129

Hydraulic head shows gear housings, fluid motor, hoses and couplings.

Quick-release, self-sealing couplings spin on and off like wing nuts. Hose connections are conveniently located at front or rear of truck.

Rugged gear-type pump is driven by PTO . . . pumps oil to reversible gear-type fluid motor which rotates digger.



Here, Holan 4401-H digger and Holan 4700F derrick work as a hydraulic team. With a double-winch-and-sheave arrangement, derrick handles digger and pole at the same time. Digger and derrick use the same hydraulic system.

HYDRAULIC POWER MAKES BORING JOBS PLEASANT

Holan's new hydraulic digger is smooth going down. In fact, the 4401-H digs holes so easily that you appreciate most what it doesn't do. It doesn't vibrate and tire the workmen. It doesn't create mechanical stresses when stalled. And it doesn't require a lot of maintenance — there are no bearings, no universal joint, no shear pin, no complicated mechanical linkages. Putting it positively, the 4401-H makes hole-digging anywhere easier than ever before.

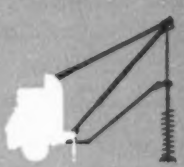
The Holan 4401-H Hydraulic Earth Borer digs holes from 8 to 20 inches in diameter and up to eight feet deep. Write for the new catalog.

Line construction bodies for light to heavy-duty. Crew compartments optional. Efficient tool compartments and drawers.

Service bodies for chassis up to 1½ ton. Lengths, 72", 75", 84", 90", and 102".

Hydraulic derricks designed for rear mounting. Capacities to 12,000 lbs. Also, light-duty, power-operated derricks.

Ladders to 40' with all phases completely hydraulic. Pump actuated by P.T.O. or separate engine drive with electric starter. Also, expertly-engineered mechanical ladders to 32'.



Portable mechanical and hydraulic earth borers with optional rotation.

Hydraulic towers from 17' to 30' with rotary, stationary, or transverse platforms. Exclusive box-girder telescoping mast.

J.H. HOLAN® CORPORATION

4100 WEST 150TH STREET
CLEVELAND 11, OHIO

OTHER PLANTS:
HOLAN Thrift Line CORP., Griffin, Georgia • J. H. HOLAN CORP., Phoenix Div., Arizona
BRANTFORD-HOLAN LIMITED, Brantford, Ontario

THE NAME THAT MEANS WORK SIMPLIFICATION

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FLASHES AND PLUGS

SERVICE DELUXE. A man in Charlestown, W. Va., was still on the telephone turning in a fire alarm when he looked out the window. A fire engine already was in front of his house.

The truck had been touring the neighboorhood when the alarm was received.

•

NEED RADIO-TELEPHONE. The parents of a teen-age boy these days know exactly where he is at all times. He's in the family car.

The only trouble is that they don't know where the car is.

•

CALIFORNIA CHAMBER SKULLDUGGERY. A report from St. Petersburg, Fla., has it that though "St. Pete" calls itself the Sunshine City, its special telephone directory which lists telephone numbers in numerical order has these names following each other in succession:

Lloyd S. Ice, Miss Ruth C. Snow and Mrs. Harry M. Frost.

The listing was coincidental.

•

CHARGES WAIVED. As Vice President Richard M. Nixon began speaking at a Republican rally in Springfield, Mo., on Sept. 26, someone handed him a note. He looked at it and announced: "It says Norman Winters, call home collect."

"Boy," he added, "his wife must really be looking for him." The crowd roared.

•

TOO, TOO MUCH. The telephone rang recently at Montgomery Field, the Lall park of the Roswell Rockets baseball team in Carlsbad, N. M., and a voice asked:

"Who's gonna play tonight?"

"Pampa, Tex." replied the operator on duty.

"Who they gonna play?" the caller asked.

In silence the operator replaced the receiver on the hook.

•

A FINE HOW-DO-YOU-DO. A Hudson, Wis., man was headed home from northern Minnesota when the clutch in his car failed. As a result, the auto could only go backward.

So backward he went, for 54 miles—from Long Prairie to Sauk Rapids, Minn., where someone telephoned police at St. Cloud.

The backward journey came to an abrupt halt when police arrested the intrepid Wisconsonite on a charge of careless driving which carried a $15 fine.

The traveler then wired home for money to repair his car and resumed his journey, this time forward.

CIRCULATION

Guaranteed circulation of this issue is 11,541 of which 10,862 is paid.

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THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1901

October 13, 1956

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McDonald-Thompson, San Francisco, Cal. Also offices in Los Angeles, Seattle, Dallas and Houston, Tex.; Tulsa, Okla., and Denver, Colo.

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Telephone WA bash 2-2435

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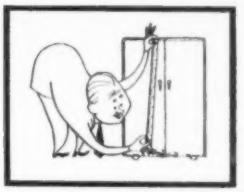
STROMBERG-CARLSON

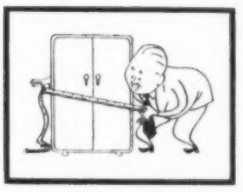
F-40 XY® 40-line PBX...

a BIG revenue-builder in a small package

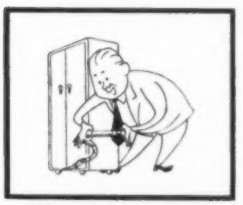
Now you can "sell" PBX service to many business firms which badly need a compact internal dial system with central office connections, but lack space for cumbersome bays, power supply, batteries, etc.



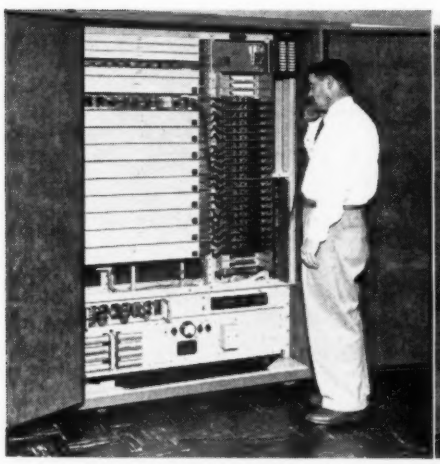
It's only this high (6'4")



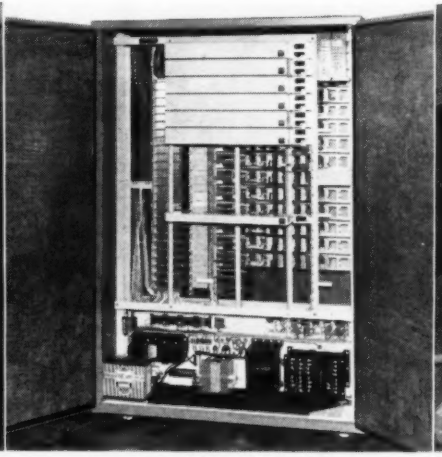
It's only this wide (4'1")



It's only this deep (2')



Front interior of cabinet, with a test under way. Note the thick Fiberglas acoustical insulation on the doors and sides . . . it's quiet!



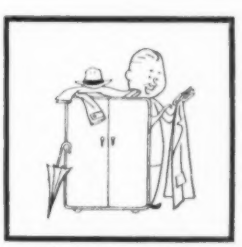
Rear view of the F-40 cabinet shows power supply in base with stand-by battery. Completely self-contained.

Cordless turret approximates the size of a modern typewriter. Furnished in office gray with attractive color-code keys. Attendant's telephone furnished in matching gray with or without standard operator's headset.

The F-40 cabinet, with its capacity of up to 40 lines and 10 trunks, needs only 8 square feet of floor space. It is installed simply by connecting telephone cable leads and plugging the power supply into a standard 110-volt AC outlet.

The attendant's cabinet, no bigger than a typewriter, uses keys for answering and completing calls. The attendant's phone is matching gray. All other stations can be equipped with standard instruments.

For selling aids and further details on the revenue-boosting F-40, contact your nearest Stromberg-Carlson office.



It looks like a regular office wardrobe

It rolls anywhere

STROMBERG-CARLSON COMPANY

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FREE

NEW BOOKLET

DATAFAX

Quick

Economical

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Transmission

of

All Data

STEWART WARNER SW ELECTRONICS

a Division of Stewart-Warner Corporation

SHOWING DETAILS OF

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Department 24
1300 No. Kostner Ave.
Chicago 51, Illinois

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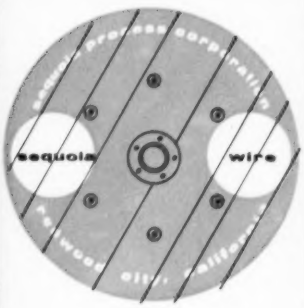
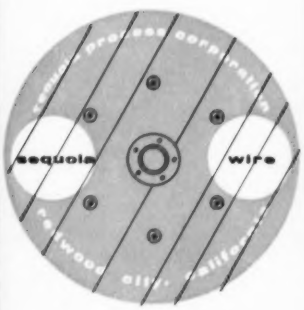
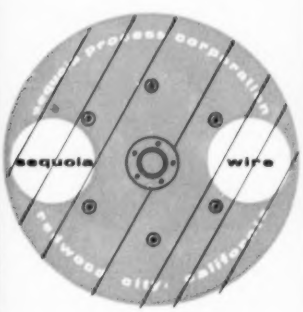
a frank report

from the industry's newest manufacturer of plastic cable







Our West Coast facilities are making cable now....

In June our Redwood City, California, plant shipped its first order of telephone cable—manufactured on the most modern equipment obtainable. Meticulous quality control, we believe, makes this cable as good as any of its type ever made. More new processing equipment is now being installed.

And our delivery situation is this....

Depending somewhat on the size of cable you require, we will be able to make delivery in 60 days (or better). We have some popular sizes available from stock. As we are located in the West, shipping time to western users will be only a matter of several days.

We offer you more than telephone cable....

Sequoia feels that service is an important part of sales. We can and want to provide you with engineering assistance. May we analyze your installation, splicing and other problems and have our experienced engineers help supply solutions?

If you're near San Francisco, won't you visit our plant?

Sequoia is new in the telephone business, although for years we have been making electronic wire and cable to meet rigid military specifications. We want to meet you and have you visit our plant and facilities. In Redwood City, just 30 minutes south of San Francisco, via Highway 101.

You know Harry Burd....
Harry Burd, a veteran in the telephone field and one of the best known men in the cable manufacturing industry, has joined Sequoia as a special consultant for manufacturing and marketing.

GENERAL OFFICES
2201 Bay Road, Redwood City, Calif.,
EMerson 9-0331
SALES OFFICES

Chicago
544 W. Washington Blvd.,
DEarborn 2-2060

Los Angeles
11830 W. Pico Blvd.,
BRadshaw 2-0124

Newark, N. J.
17 William St.,
MArket 3-5215

Sales through authorized telephone distribution

3930

sequoia wire

a division of Sequoia Process Corporation

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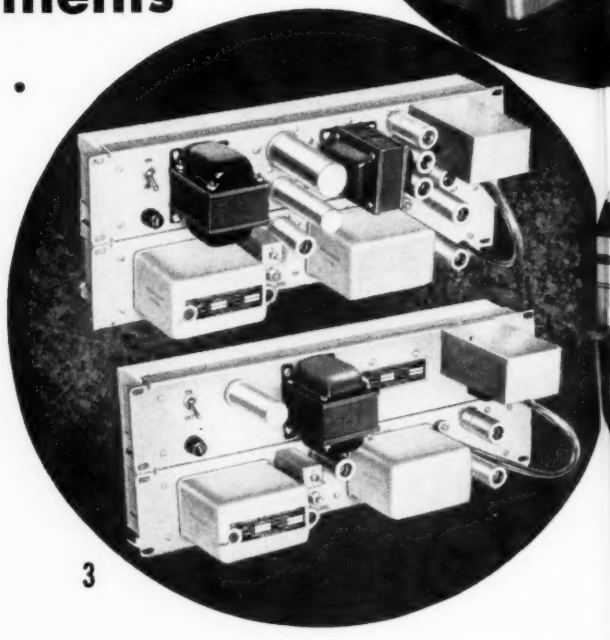
SEE NORTH AT THE USITA SHOW

for significant developments in telephone equipment . . .

1



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During the USITA Convention in Chicago, October 15, 16 and 17, you will have the opportunity to examine and learn of important developments in telephone equipment at the NORTH ELECTRIC COMPANY displays in Rooms 517-A, 519-A, 520-A, and 526-A in the Conrad Hilton Hotel.

be sure to see . . .

1 NORTH N-541 Telephones — the Telephone with "Hi-Fi" transmission and reception quality, available in black and Color-Tones!

2 NORTH By-Path Crossbar— the perfected and approved By-Path Crossbar Switching System available to the independent industry now.

3 NORTH improved Carrier — opening new revenue potentials through expanded service without the expense of physical line construction.

4 NORTH Au-Tollizer — automatic toll ticketing for direct distance dialing.

5 NORTH Wall Phones — exciting new color phones for space-saving wall installation. Also available in black.

6 NORTH Line Supplies—expanded distribution facilities for even faster and more efficient service for all classifications of line supplies, tools construction equipment, etc.

Make it a point to visit NORTH in Rooms 517-A, 519-A, 520-A, and 526-A.

NORTH

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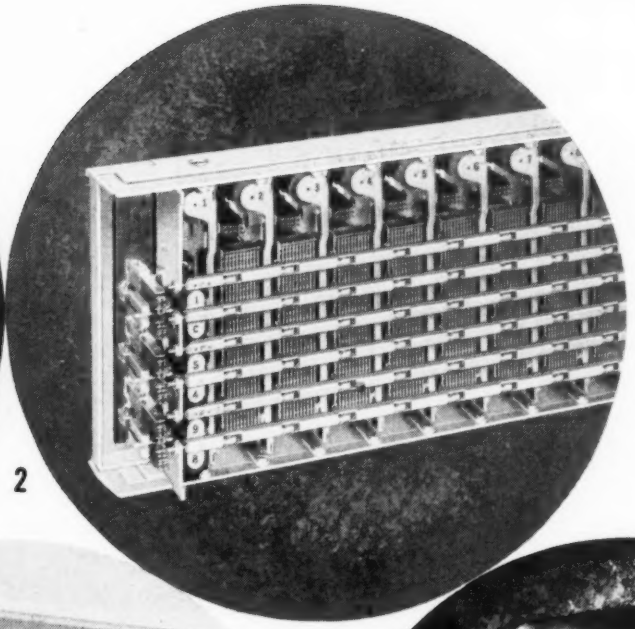

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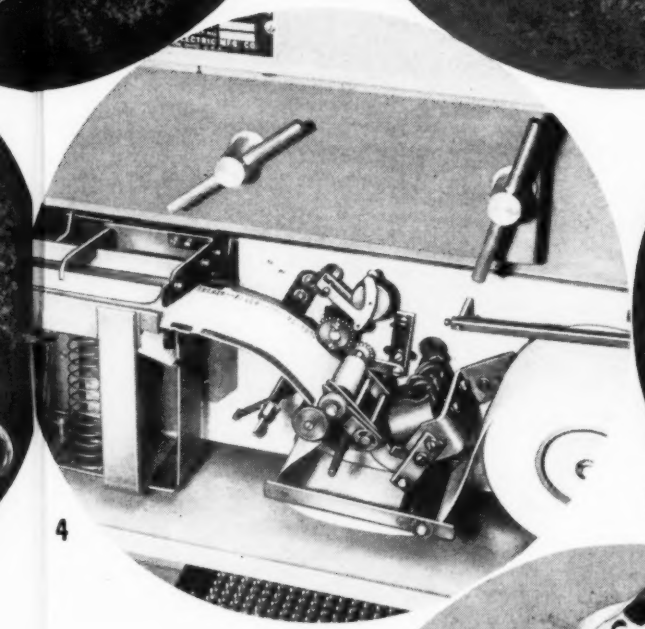

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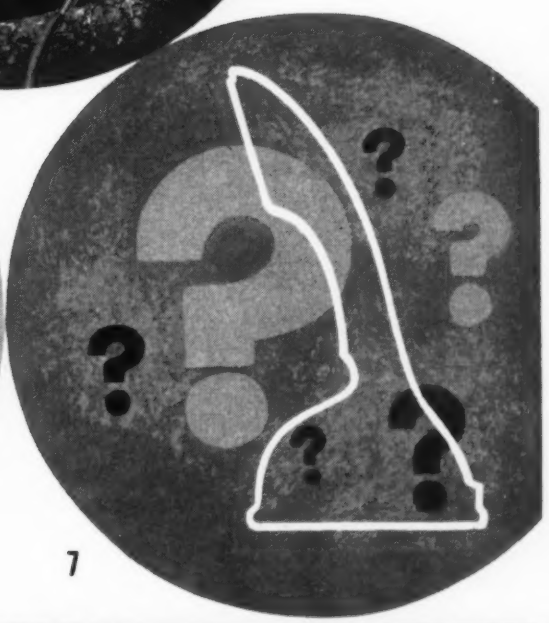

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7 and the surprise of the show

NORTH ELECTRIC COMPANY

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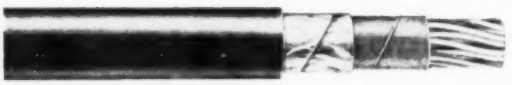
TELEPHONE CABLES

For Every Application

TYPE 144



AERIAL AND DUCT

Listed by REA, Type 144 cables are made in three sizes #24, #22 and #19 AWG. They are polyethylene insulated, aluminum tape shielded and jacketed with heavy duty Vinyl. Cables range from 6 to 202 pairs.

TYPE 150

AERIAL AND DUCT

A premium construction offering fully color coded, polyethylene insulated pairs. An .002" copper tape shield, and a hard service vinyl jacket. These cables are made in sizes #24, #22 & #19. Range 6 to 202 Pairs.

TYPE 190

AERIAL AND DUCT

Type 190 offers the excellent electrical characteristics of Polyethylene in the insulation and the jacket. The conductor assembly is aluminum shielded. Manufactured in #24, #22 & #19 AWG. Range 6 to 202 Pairs.

TYPES 160 & 162

SELF-SUPPORTING CABLE

Type 160 with Copperweld conductors or Type 162 with hard drawn copper conductors are both insulated with Polyethylene. The pairs are fully color coded. A copper shield and tough vinyl jacket protects the assembly. Made only in #19 gauge in 6, 11, 16 & 26 pair cables.

TYPE 122

INSIDE TELEPHONE

PWC Inside Telephone Cables are vinyl insulated and jacketed. They feature fully color coded pairs and a Nylon Rip cord for easy stripping. Made in sizes #24, #22 & #19, range 2 to 101 Pairs. Brown or Ivory.

TYPE 166

BURIED

An excellent design for direct burial. Polyethylene insulated, fully color coded pairs. Pair assembly covered with extruded Polyethylene belt, Copper shield, and Vinyl Jacket. Range 6 to 101 Pairs.

TYPE 177

RURAL DISTRIBUTION

PWC Rural Distribution Wire is made in constructions from 1 to 16 pairs. Each conductor is insulated with polyethylene and jacketed with colored vinyl. Pairs are assembled around a 109-E steel messenger wire.

NO. 214 - RURALINE - NO. 212

INSULATED LINE WIRE

The new polyethylene insulated line wire designed for low cost rural service extensions. Two Copperweld conductors are insulated in parallel. Size #14 is identified as No.-214, size #12 as No.-212.

OTHER PWC TELEPHONE PRODUCTS

There are many additional products manufactured by PWC for the Telephone Industry. In addition to the complete line of thermoplastic inside telephone wires, Urban and Long-Span distribution wires, many custom cables are manufactured to customer specifications. For additional information or for special cable engineering contact your nearest PWC distributor or write direct to the Plastic Wire & Cable Corporation.

PLASTIC WIRE & CABLE CORPORATION

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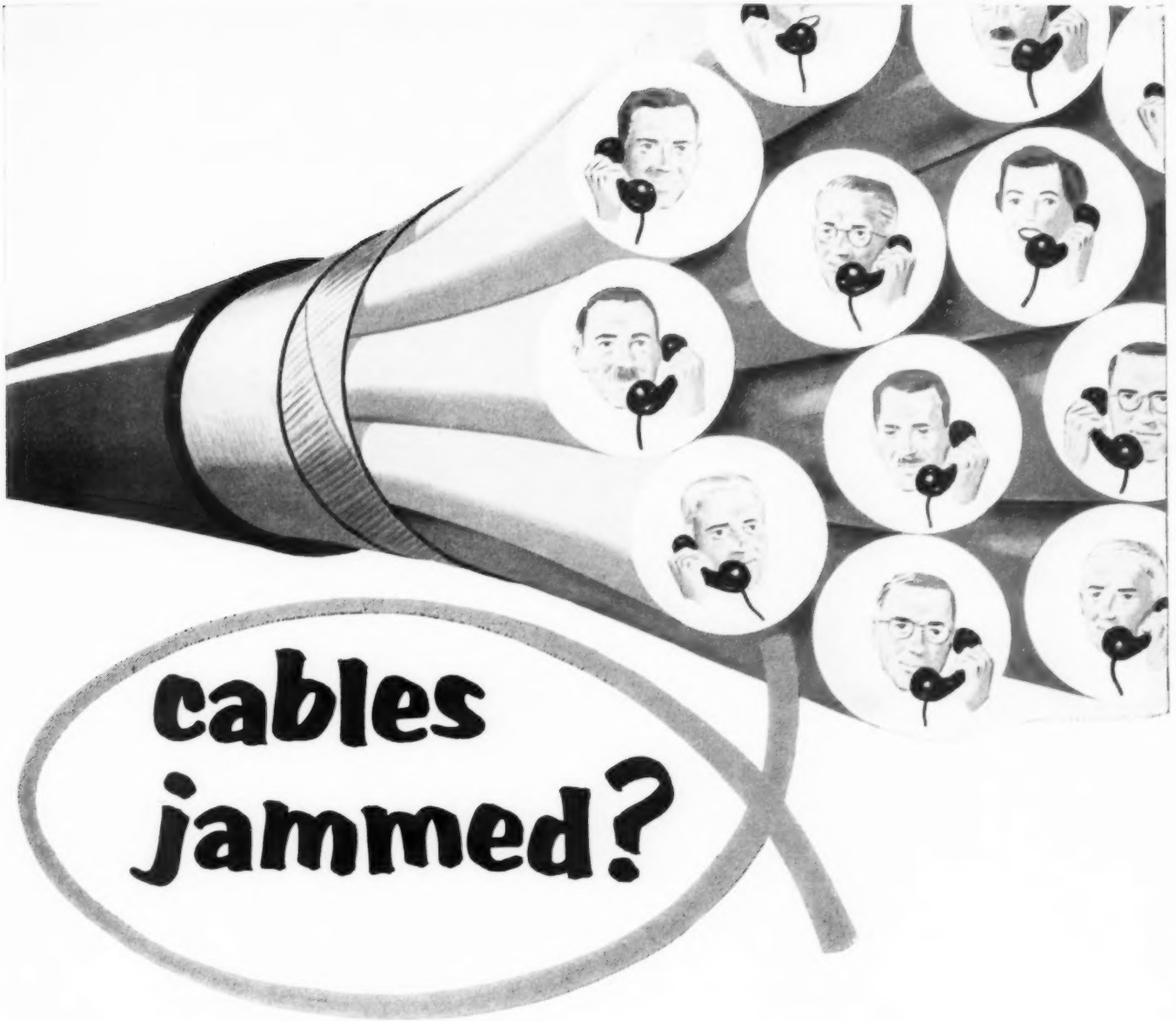
XUM



LENKURT TYPE 45BN CARRIER

can multiply the capacity of your present cable

The easy, economical, effective way to increase the capacity of your existing cable is to use Lenkurt Type 45BN Carrier.

Use this carrier system to link exchanges, or to provide new toll channels. Type 45BN Carrier provides up to 24 toll-grade channels on only two pairs within the same cable—large-scale facilities in small space!

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Compact, convenient plug-in sub-assemblies conserve space—and permit fast, "on-the-spot" inspection and servicing. Voice-level regulation and frequency-shift signaling are built-in. Power consumption is low.

Interconnectable at carrier frequencies

Type 45BN Cable Carrier fits into your present picture, and your future plans, too. It connects to Type 45A open-wire carrier systems, or to Lenkurt Microwave, at carrier frequencies. Now you can have a complete carrier network with a single basic type of equipment; there's no need for cumbersome, expensive "back-to-back" interconnections at voice frequencies!

Send for the latest technical information on Type 45BN today. Write Automatic Electric Sales Corporation (HAymarket 1-4300), 1033 West Van Buren Street, Chicago 7, Illinois. In Canada: Automatic Electric Sales (Canada) Ltd., Toronto. *Offices in principal cities.*

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CLOSE-UP OF A Grasshopper

Used by the Telephone Switchboard Manufacturers for the past fifty years, this effective fuse is now being specified by electronic and computor engineers.

Small in size, simple in construction, accurate and positive in operation in terms of current rating, operating time and ground or alarm switching.

Aptly termed over the years by the trade "Grasshopper" Fuses because of their appearance and animated release. Made to eighteen standard ratings varying from .18 to 5.0 amperes, voltages up to 160 volts, from 1½ to 5 minutes operating time and slotted for No. 6 and No. 10 screws. Also made to customer specification when required. When specified, the fuse wire is sheathed in glass tubing.

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Have you designated the vital records that can *keep you in business?* Have you made adequate provision for their protection?

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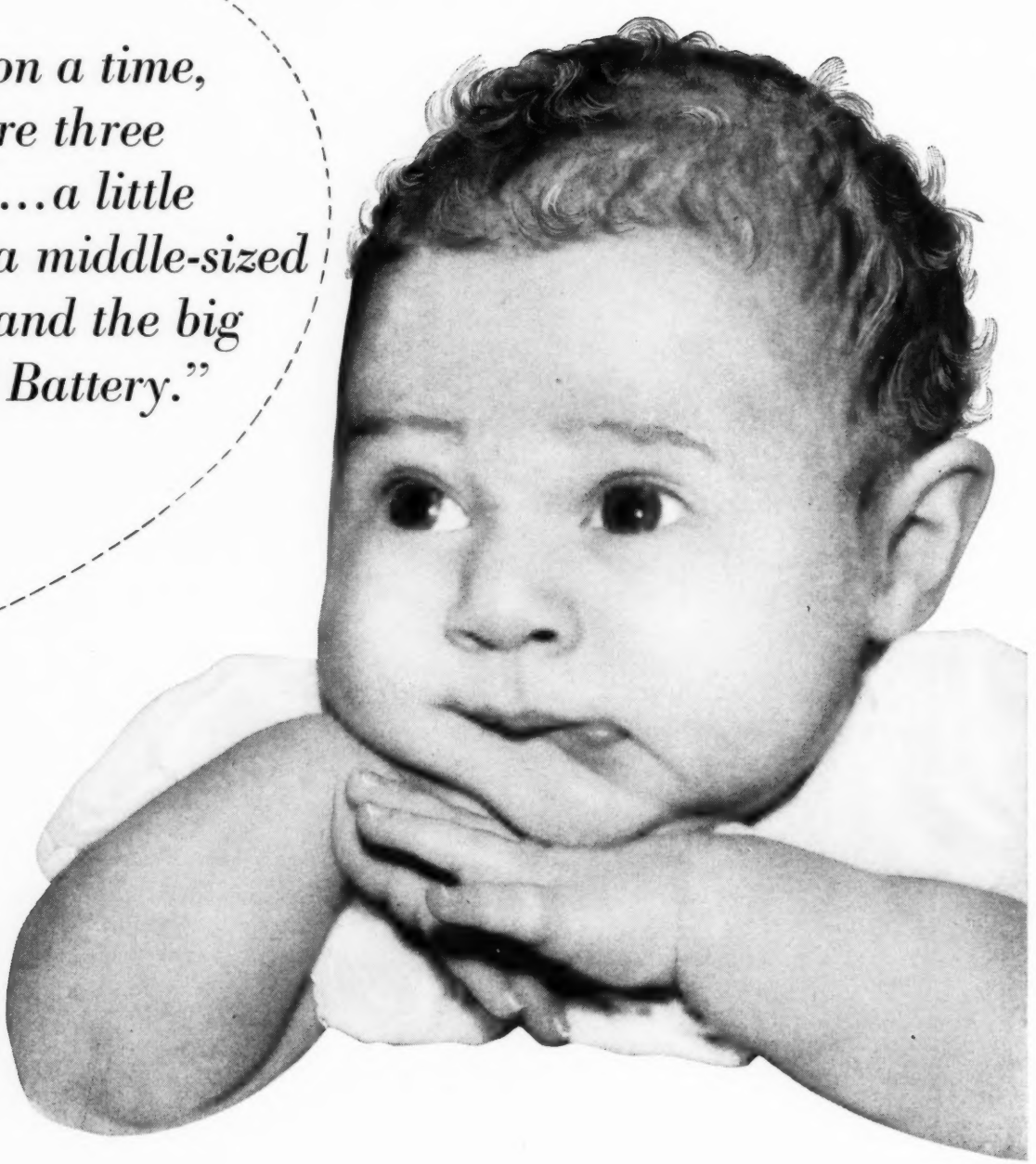
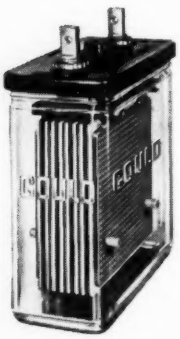
"Once upon a time, there were three batteries...a little battery, a middle-sized battery, and the big ***gould*** *Battery."*





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IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

Demonstration of so-called "electronic brain" at Naval Research Laboratory convinces Welch that electronics will have considerable effect on the type and amount of telephone plant within next decade. Bell company and REA co-op to end duplication of service.

RECENTLY your correspondent was invited out to a demonstration of so-called "electronic brain" equipment at the Naval Research Laboratory, which is situated just a little beyond the southern Maryland boundary of the city of Washington. Here is where giant computing and other miracle machinery is running night and day figuring out mathematical problems in a matter of hours or days, which would take the most skillful trained mathematician months, years, or even a lifetime to work out with paper and pencil, or by old-fashioned conventional, manually operated business computing machinery.

Among other things, the Naval Research Laboratory is busy these days figuring out ratios, logarithms, trajectories, and interspatial triangulation positions (don't ask this writer to explain or define that last one) to be used in connection with the launching of the man-made moon, or "earth sattelite," some time next year. All this advance mathematical computation is necessary to determine the precise anticipated position of the "earth satellite" at any split instant from the time the initial phase launching rocket is fired, probably at Patrick Air Force Base (Fla.) next year, until the little artificial moon, expected to be about the size of a basketball, loses its momentum and disintegrates as it falls back into the gravitational pull of the earth's surface and is destroyed by the atmospheric friction.

Imagine this writer's surprise, however, to learn that the so-called "electronic brain" technique has many other possible uses and applications than the solution of mathematical problems. Specifically, it is altogether possible that these techniques can be used to step up the *transmission* of intelligence at a tremendous rate. As such, the "electronic brain" has already challenged the attention of the scientific branches of communication industries, such as Bell Telephone Laboratories.

How can the "electronic brain" be used to transmit intelligence, as well as work out "math" problems? Theoretically, the answer is as plain as "Yes" and "No." In fact, that is exactly the basis for the entire procedure—a simple alternative of a positive pulse and a negative (or absence of) pulse.

For mathematical purposes, this means that all the "problems" to be worked out must first be reduced (or "coded," as the experts say) into terms of yes-or-no information, and then fed into the electronic machine for matching up ("processing" is the word used here) with similar information. The instantaneous result must then be translated back ("decoded") into practical terms which can be intelligible or recognized as the answer to the original problem. When the "process" is being used to send messages long distances, instead of merely working out mathematical computation, the three-phase sequence of the process is referred to as "coding-transmission-decoding."

The intriguing part of this new world of processing, or sending intelligence, is the reduction of the raw information materials to terms of the basic yes-and-no common denominator. Take such a simple process as adding two or more figures. Virtually all modern nations use the Arabic or decimal system of adding numbers by series of tens. We add 2 and 2 to make 4; then 4 and 5 to make 9. That's as far as we go with one digit. If we add any more, it spills over into a second digit and so on. We reverse this process in subtraction. We qualify it with certain elaborations in multiplication and division. But, basically, the whole Arabic system is built on the same old series of nine positive numbers and a negative—zero.

The Arabic sequence of numbers was widely adopted by all races, nations, and civilizations because it provided about the only really workable system of mathematical computation ever conceived in ancient times. Compared with it, the clumsy old Roman system of using letters of the alphabet for numbers was hopeless, as far as efficient mathematical computation was concerned.

But it is a fact that the Arabic decimal system is *not* the only workable system. Those interesting people of western Spain, the Basques, for example, use a digital system based on *five* instead of *ten*. A remote people, mostly shepherds, the Basques got into the habit of using the five fingers of one hand, and then the hand itself, to denote the complete digital sequence. By quickly reversing his palms, or revolving one around the other, the Basque can perform some astonishing feats of lightning calculation. He looks like he is having a fist fight with himself, but he comes out with the right answers.

The ancient Arabs probably extended the Basque's reasoning to the fingers of both hands (10 fingers) to arrive at the decimal system which we have inherited. And we find traces in the French language (in which numbers are given special names in the order of *twenties*, rather than *tens*, as in English) that the ancient Gauls might have included their toes, as well as their fingers, to arrive at a digital basis. Then, there is that weird oriental counting machine—the abacus—which has still a different concept of numerical sequence.

The lesson in all this is that there is nothing magic or necessary about our arabic decimal system. But, first, we must slough off our perfectly understandable intellectual bias in favor of the decimal system (a bias which virtually everyone educated in the United States comes by honestly enough). Yet, once we have freed ourselves of this mental strait jacket, we can readily see how a system based merely on *two*, rather than *ten*, can be just as workable, provided we use enough extra digital positions. This is called the "binary system." By using it, we immediately open up a vast new world of instantaneous electronic computation, based simply on pulse-or-no-pulse, in other words, yes-or-no.

When you walk into the computing room of the Naval Research Laboratory, you see long banks of computers made of hundreds of units of what look like radio receiving sets from the rear, all tubes and wires. From the front, there are rows and rows of flashing eye-like buttons. There are several technicians in charge at the coding desk. Here, the raw information is reduced to a "code" or digestable form to be fed into the "brain." If it cannot be fed in right away, it can be stored indefinitely in electronic memory cells which preserve the sequence perfectly until the machine is ready to take over. The same can be done at the other end, or "decoding" end. Almost as quickly as it is put in the "brain" it comes out the other end on a code tape. This tape is fed into a special decoding typewriter which automatically translates the results into conventional numbers which you and I can understand.

Telephone Industry's Stake

This is all very well for mathematics, you say, but what has it got to do with the telephone business? Here is where the "Mathematical Theory of Communications" developed by Dr. Claude Shannon of Bell Telephone Laboratories comes in. When you think of the billions of words flashing around our country, day and night, by radio, telephone, telegraph, television, etc. (to say nothing of the other written and printed messages), you can see that any short cut in the *method* of transmission can save a lot of wear and tear, and volume capacity on our communication facilities.

First of all, the "binary system" can be used just as well for letters of the alphabet as for numbers. Let us say that a positive pulse "1" equals "A" and that no pulse, or negative "0" equals "B." By adding another digital position we get four combinations 01, 00, 10, and 11. By adding another digit, or "bit" as Dr. Shannon would call it, we get eight combinations—001, 101, 111, etc. A "four-bit code" has 16 combinations. Every time you add another "bit" you double the combinations. There are only 26 letters in the English alphabet—easily handled by a "five-bit-code" (32 combinations), which is already commonly used by high-speed teletypewriters.

But, Shannon's theory goes much further than that (which, in itself, would seem to be merely going to a lot of trouble just putting letter and word combinations into yes-and-no combinations, and then taking them out again at the other end). Shannon's theory calls for *groups* of symbols or letters to be coded into "bits." It is very complicated to explain and for the layman even to grasp. But, essentially it is based on the well-known frequency or "predictability" of certain letters of the alphabet as compared with others.

If the reader remembers that fascinating old story by Edgar Allan Poe about finding Captain Kidd's treasure, "The Gold Bug," he will recall that a smart character in that story was able to figure out an entirely strange (to him) coded message simply on the basis of the frequency which certain letters, such as "e" or "a," occurred in the letter sequence of any representative passage of English words. By efficient use of this "predictability" factor, the scope of any "bit code" can be spread tremendously to accommodate the transmission of a greatly increased volume of information.

Thus, instead of wasting communication facilities on background information which is constantly and unnecessarily repeated, the Shannon theory would tend to confine the transmission of only such information as would be new or "unpredictable." By way of broad analogy, consider the background stage scenery to an act of a play in the theater. It remains the same throughout the act. Only the characters moving around and talking constitute new, unpredictable or necessary information for the eye of the spectator following the performance. Once the background scenery has been registered (or "sent") it need not be repeated until the scene changes.

Again, there are large numbers of diphthongs or double letter combinations in the English language, such as "th" for the word "the." A single binary combination could be used to transmit such information. In fact, the word "the" and other articles can be omitted in transmission, just as we do in sending telegrams. Anyone who has ever followed the condensed fine printing in the classified advertising of any daily newspaper knows that vowels, for example, can be omitted in such sequences as "rm & brd, by wk or mth, lgt hskg." This cryptic passage means, of course, "room and board, by week or month, light housekeeping." The ancient Hebrew and Aramaic languages used that short-cut, thousands of years ago, by omitting virtually all vowels. The reader was supposed to supply them from the context.

Such, in a general way, is the Shannon theory, which people in the communications industry are quite likely to hear much more about within the next decade. The immediate technical application of this theory to the telephone business is not clear by any means. But as electronic technology and automation improves, it is quite probable that the condensation of information for transmission, along lines suggested by Dr. Shannon, will be worked out, not only for recorded messages (such as telegrams and teletype), but also visual (TV) and voice (radio and telephone) communications.

To give the reader some idea of the possibilities, consider the "channel capacity" of one living person with the channel capacity needed for television. The fastest typist in the world, can handle about 150 words a minute. By using the binary system, and assuming each letter to be worth about "2 bits" (no pun intended), this champion typist would be operating on the basis of 25 bits per second. The world's champion *shorthand* writer has hung up a record of 282 words a minute, or 47 bits a second. It has been estimated on this basis that the most information any person could handle in his lifetime, working 12 hours a day for 60 years (no Sundays or holidays off) would be 50 billion bits (at 50 bits per second).

Now compare this entire lifetime of virtual slavery to the capacity of an ordinary TV channel for handling the same amount of information—50 billion bits. How long would it take? About 16 minutes. Actually the communication of information handled in an average lifetime (without trying to break any records) would hardly keep a TV channel busy for more than 10 seconds.

Think what that means! It means that *all* the information you have been able to communicate to others during *your entire lifetime*, and all the information which others have been able to communicate to you—could be entirely reduced to electronic combinations which could be sent over an ordinary

(Please turn to page 44)

XUM

REA Approves 15 Loans Totaling $7,389,000

About 5,600 rural establishments will get telephone service for the first time and many more will get improved service through 15 loans made during the period of Sept. 24-28 by REA.

The loans totaled $7,389,000 and brought the loan activity in this program for the first quarter of the fiscal year to $20,737,000. Two of the loans were the largest yet approved in Colorado and Virginia. Details follow:

Inland Telephone Co., Champaign, Ill.; $687,000, first loan (Sept. 24).

The borrower will use this loan to provide service for 1,602 rural subscribers, including 232 now without telephone service.

As the center of this project, the Inland company proposes to acquire the following telephone properties: Kempton Mutual Telephone Co., Farmers Mutual Telephone Co., Charlotte, Cullom Mutual Telephone Co., and the Moweaqua Home Telephone Co. These facilities are now providing magneto and some common battery service to 1,370 subscribers.

Construction contemplated includes automatic central offices at Cullom, Kempton and Moweaqua. The Charlotte community will be served by the Cullom exchange.

The proposed Inland system will consist of two separate areas, one covering the town and surrounding rural areas of Moweaqua, and the other embracing the towns and adjacent areas of Kempton, Cullom and Charlotte.

James L. Capel is president and Max Hoagland is manager of the Inland Telephone Co.

*

Farmers Mutual Telephone Co., Stanton, Iowa; $179,000, first loan (Sept. 24).

The borrower, a commercial company, will use these funds to improve service for its 491 existing subscribers and to serve 24 rural families now without telephones.

Construction proposed by the borrower includes an automatic central office and headquarters building in Stanton.

Herb Honette is president and Roy Falk is manager of the company.

*

Urbana (Mo.) Telephone Co.; $593,000, first loan (Sept. 24).

The borrower is a commercial company which plans to use these loan funds to bring telephone service for the first time to 774 farm families and other rural residents. In addition, it will provide improved service for 525 existing subscribers. Of these, 303 are now being served by the borrower's Hermitage, Louisburg, Preston and Urbana magneto exchanges. The remaining 222 are subscribers of the Wheatland Telephone Co. whose facilities the Urbana company plans to acquire.

The borrower proposes to construct automatic central offices to replace existing facilities at Hermitage, Louisburg, Preston, Urbana and Wheatland. In addition, it is planning a sixth automatic exchange at Cross Timbers in an area with no telephone service.

Carl Gatliff is president and manager of the Urbana Telephone Co.

*

Piedmont Telephone Co., Manassas, Va.; $205,000, third loan (Sept. 24).

The borrower proposes to use these loan funds to provide facilities to serve 433 additional subscribers.

The three REA loans, totaling $571,000, will enable the Piedmont Telephone Co. to offer new and improved service to 1,443 rural subscribers in Fauquier, Loudoun and Prince William counties. The system is now in operation and provides automatic service to about 850 subscribers through its Haymarket and Lenah exchanges.

W. T. Costello is president and Stanley J. Owens is manager of the Piedmont Telephone Co.

*

Public Service Telephone Co., Reynolds, Ga.; $194,000, second loan (Sept. 26).

The borrower intends to use these funds to serve 621 farm families in its service area who were not provided for in the first loan.

The two REA loans, totaling $842,000, will make possible new and improved telephone service to 1,858 subscribers. The five modern automatic exchanges of the system are in operation, serving about 1,300 subscribers in Bibb, Crawford, Macon, Monroe, Taylor and Upson counties.

H. C. Bond is president and manager of the company.

*

Pineland Telephone Cooperative, Metter, Ga.; $302,000, fourth loan (Sept. 26).

This loan will enable the borrower to expand its area to serve 339 additional rural subscribers. One hundred and six of these are families without telephones. As a nucleus for the new service, the borrower plans to acquire the Bartow Telephone Co. and the Davisboro Telephone Co. These companies are now providing magneto service for 233 rural subscribers.

Construction planned by the Pineland cooperative includes automatic central offices at Bartow and Davisboro.

REA loans to the cooperative total $1,526,000 with which it will offer new and improved service to 2,624 rural subscribers. Seven of its new automatic exchanges already are in operation serving about 1,800 subscribers. The cooperative will operate in Burke, Candler, Emanuel, Jefferson, Johnson, Laurens, Tattnall, Treutlen and Washington counties.

W. O. Coleman is president of the cooperative. Eugene R. Britt is the manager.

*

Cooperative Telephone Exchange, Stanhope, Iowa; $187,000, first loan (Sept. 27).

The new borrower proposes to use these loan funds to improve service for its 449 present subscribers and furnish initial service for 25 farm families.

It plans to remodel the present central office building and install automatic equipment, and to purchase and remodel another building in Stanhope for headquarters.

Peter Peterson is president and William Blakely is manager of the Cooperative Telephone Exchange.

*

Saco River Telegraph & Telepohne Co., Bar Mills, Me.: $206,000, second loan (Sept. 27).

(Please turn to page 48)

Transmission Testing

The advent of Direct Distance Dialing brings new significance to transmission problems in telephone plant.

By HAROLD B. McKAY

Part 2

OUR PREVIOUS article (TELEPHONY, Oct. 6, p. 26) discussed the means by which a 1,000-cycle tone source could be used with a db meter to make transmission tests on a telephone line or associated apparatus. These tests involved voice frequency lines within exchange limits.

The principle of transmission testing finds a great deal of application in toll circuits. Here tests are made not only at voice frequency, but also at carrier and signal frequencies. Perhaps the first example that comes to mind would be simplex and composite circuits. These circuits depend for their success upon components which are very carefully balanced. Not only must the lines used be balanced, but the repeat coils and other parts must be matched carefully.

When these circuits are used on cable, exceptional care must be used in splicing in order to preserve the balance. In fact, any cable of toll grade may require extra considerations such as balancing out end-sections by the addition of small condensers across each pair, or by using a bridged length of cable at the central office for the same purpose. Splicing is often done in such a manner that any one pair will not be next to the sheath for too long a distance and hence have excessive capacity to ground.

These matters are part of the design considerations, and plant which is to be used for high grade circuits, is usually built to high standards. However, when trouble occurs, or the plant falls short of its objective, transmission testing can be a handy thing. A wire line can be tested for losses along its length as described in the previous article. The central office portion can also be tested by similar means.

However, when the question of a fine degree of balance is involved, a different technique is required. The idea of a bridge operating on alternating current is not new in the telephone business. A "balance tone test" has long been a piece of standard equipment in many central offices. It consists of a Wheatstone bridge arrangement, powered by a "hummer." This is a 1,000-cycle oscillator made by connecting a telephone microphone button to a receiver unit. It is still manufactured as a tone source for low priced inductance bridges.

Balance Test

The balance tone test was arranged so that a circuit, such as a switchboard cord, could be plugged into it, and a receiver plugged into another jack to listen. The cord could be twisted around, and an unbalance or noise would sound as a tone in the receiver.

The same principle can be used for improvised impedance testing. *Fig. 2.1* shows a method whereby a 1,000-cycle oscillator and a db meter can be used to make balance tests on units like repeat coils. The resistors shown in the other arms of this bridge must be matched to within one-tenth of an ohm.

The usual non-electronic db meter or multi-meter is limited by its sensitivity and its frequency response. The sensitivity of the meter may fix the lower level at about minus 20 db. Cheap meters may not even cover the full audio range, but instruments made for telephone use can reach as high as 50 kilocycles which would make them useful with some carrier systems.

When the limitations of this type of equipment are reached, electronic apparatus is then used. Probably the first choice is the vacuum tube volt-

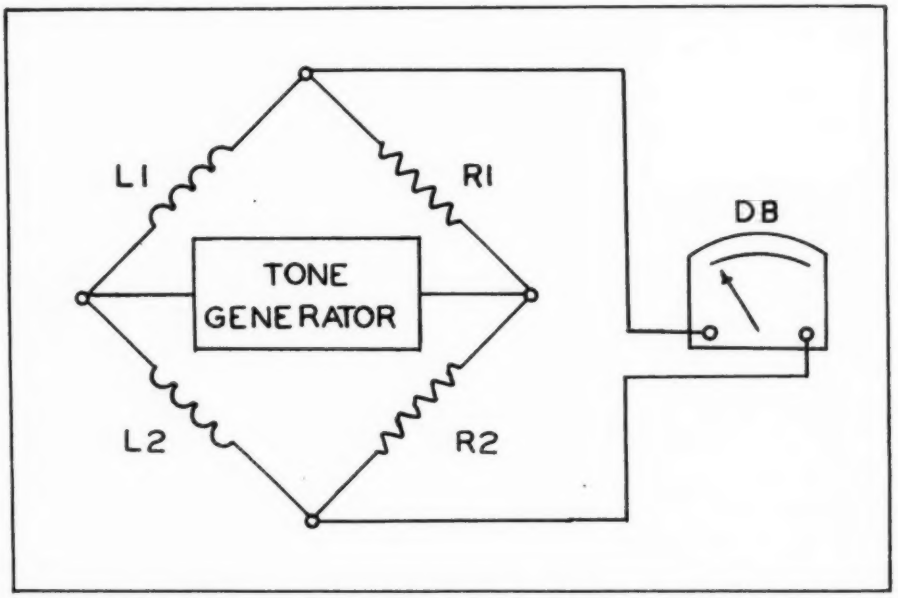


Fig. 2.1. L1 and L2 are windings of a repeat coil being tested for balance. If coils balance, there is no reading on the meter. R1 and R2 and 300-ohm precision resistors, matched to within one-tenth of an ohm.—From a Shallcross Mfg. Co. drawing.

XUM

meter (vtvm). This instrument is essentially a voltmeter which is equipped with one or more stages of application. It may operate from batteries or from the ac. In this case, it contains carefully designed voltage regulating equipment so that fluctuations of the line voltage will not affect the meter readings.

Different makes of meters will have different features. They may or may not read both ac and dc; they may go as high as two, five, 10, or even hundreds of megacycles. Some may have an ohmmeter function built into them. Ordinarily, it is most economical to get the kind that is needed for the work you are doing. Many telephone offices have standardized on ac meter which will read from about —60 to +50 db. This covers a voltage range of from .001 to 300 volts.

The principle advantage of the vacuum tube voltmeter is the wide voltage range obtainable in the one instrument, and the fact that it will read emf's as low as one-thousandth of a volt. Another big advantage is that the power to operate the meter movement is not drawn from the circuit under test; the vacuum tubes supply the power. The input to a vtvm is usually to the grid of a tube. A resistance network for various ranges and a capacitor to block dc may also be present. Very high frequency instruments may have a vacuum tube or crystal diode probe, but this is not usually found on instruments in the telephone range which reach four or five megacycles—the top video range on wired television.

Fig. 2.2 shows a simplified diagram of a vacuum tube voltmeter circuit. The input to the grid is very high, and is practically limited only by the range setting resistors which may be ahead of the tube. Some instruments may have an input impedance in the millions of ohms. Obviously, such meters can be used on a wide variety of circuits without causing interference, because practically no loss occurs through millions of ohms.

Relative Readings

The vtvm can be used as a bridging instrument across any circuit to measure relative decibels. That is, it can be moved from one part of a normally terminated circuit to another and the difference in reading will show the relative loss. If the vtvm is to be used for terminated measurements, a 600-ohm resistor must be placed across the terminals if an accurate reading in dbm (Decibel Milliwatt—Standard) is wanted.

In all transmission tests, certain precautions must be observed if accurate readings are to result. For instance, 600 ohms is the standard termination. This is because the average telephone line, if there is any such thing, is regarded to have 600 ohms impedance at 1,000 cycles. Obviously, all lines do not have this impedance; but this is standard upon which the measurements are based. That is, this is the standard for the meter you will probably use.

However, many lines have impedances which are definitely known to be other than 600 ohms. Some loaded cables, for instance, are 900 ohms, some are 1,100 ohms. When these cables are connected to central office equipment, the central office equipment has a

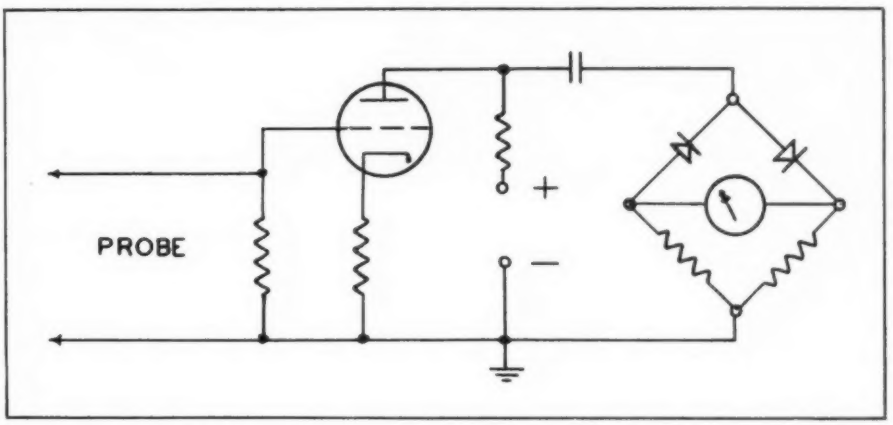


Fig. 2.2. A modern vacuum tube voltmeter of a quality acceptable to telephone companies may include several tubes as well as special regulating or stabilizing circuits. The above sketch shows the general principle. If an ac voltage is applied to the probe, it will be amplified by the tube, rectified, and then sent to the meter. Thus it is the power of the tube that moves the meter, and very little current is taken from the circuit being tested.—From a Hewlett-Packard Co. drawing.

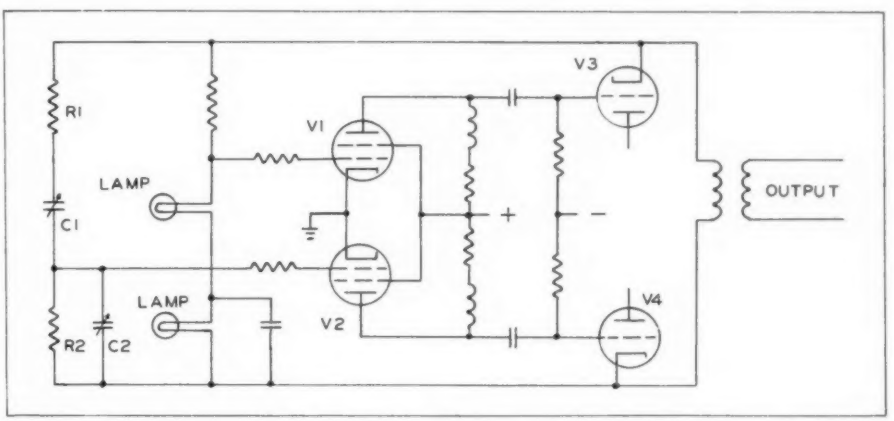


Fig. 2.3. This is a simplified schematic drawing of a variable frequency oscillator of the type used by telephone companies. Tube V2 is the actual oscillator and tubes V3 and V4 are balanced cathode followers. These supply the output through the transformer and also create a feedback path through the two lamp bulbs. These lamps act as regulators, automatically stabilizing the output voltage. The frequency is adjusted by the condensers C1 and C2 which are connected to a large dial on the front of the instrument.—From a Hewlett-Packard Co. drawing.

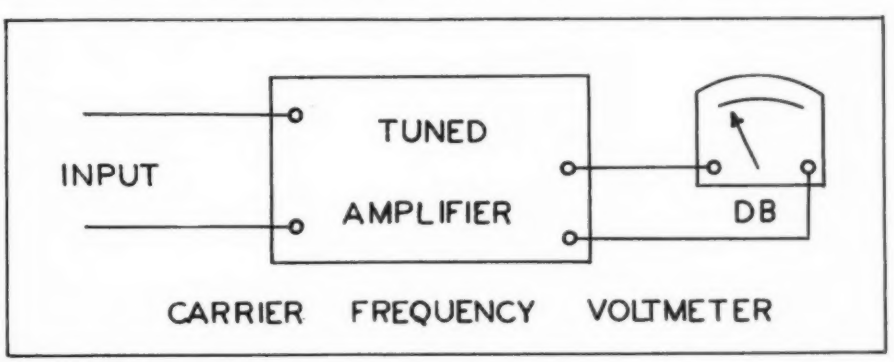
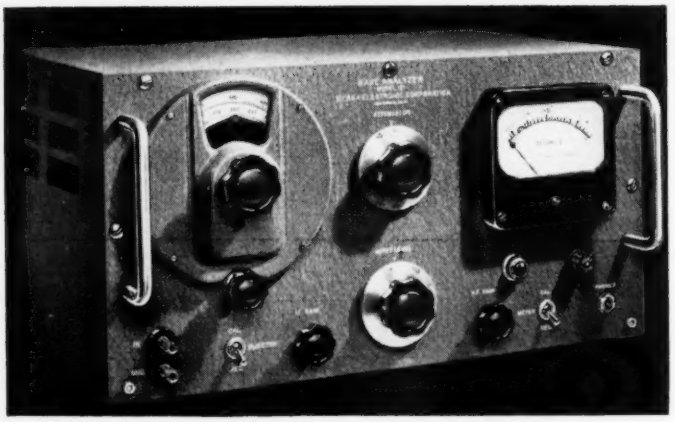


Fig. 2.4. A carrier frequency voltmeter is essentially a vacuum tube voltmeter, the amplifier of which can be tuned like a radio set to different frequencies.



A carrier frequency voltmeter is essentially a tuned amplifier coupled to a decibel meter. This one is marketed as a "Wave Analyzer" because it has sufficient accuracy to track down carrier troubles such as interference, or crosstalk from other systems or sources. It is also of great value in slope or bulge troubles, where different carrier channels are received at substandard levels. It is portable and can be used at repeater stations to locate difficulties.—Photo, courtesy Sierra Electronics Corp.

A modern vacuum tube voltmeter of the type preferred by many telephone companies. It measures ac volts and decibels.—Photo, courtesy Hewlett-Packard Co.

matching repeat coil which transforms the 600 ohms of the subscriber lines and the office switching equipment to the 900 ohms of the cable.

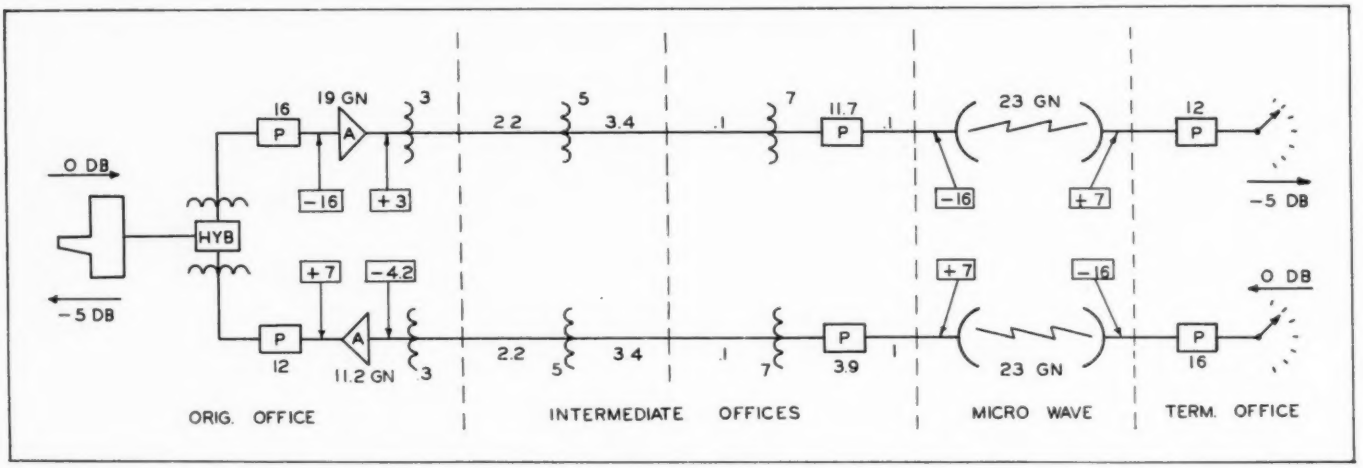
When working with this kind of plant, a matching repeat coil or transformer should be used with the db meter to transform the 600 ohms of the meter to the value of the cable. Of course, if the transmission test is made through the equipment at the end of the line, the matching transformer in the equipment takes care of this. If, however, the circuit is to be tested at a midway point, such as at an intervening central office, a matching coil would have to be used with the meter. One of the type coils normally used on the trunk would do.

Balanced or Unbalanced

Another item to watch with vacuum tube voltmeters is that the input may be unbalanced or grounded. The sketch shown in *Fig. 2.2* is like this. This type of input cannot be placed directly across a voice frequency pair if accurate results are expected, because the meter itself grounds the pair and measures the transmission on only one side. A repeat coil or transformer at the input of the meter takes care of this. The manufacturers of the voltmeters supply this as an accessory. Such a transformer may come equipped with a toggle switch for 600 ohms or high impedance bridging tests.

In addition to voice frequency measurements, the vacuum tube voltmeter is of particular use at carrier frequencies. It may be used to measure the

(Please turn to page 50)



Use of the decibel method for analyzing transmission on a line is shown in this actual working circuit. This trunk originates in a 3 CL toll office, goes through cross-connects in two other offices for a total distance of 10 miles, then takes a radio circuit for 400 miles to a No. 4 toll office. The numbers next to the various units represent the loss in those units. The numbers in boxes with arrows are cumulative readings in db which should be obtained in tests made at those points. GN stands for gain instead of loss, as in the case of the microwave and the repeater amplifiers A. The boxes marked P are loss pads especially inserted in the line to cancel some of the gain and to keep the level at different spots within engineering limits. The circuit achieves an overall loss of 5db, which is the standard for this type of circuit regardless of length. Engineering data for this type of circuit would call for predetermined gain at the repeater and the radio link, based upon the calculated losses in the cables, coils and pads. Any departure from these values as found by actual measurement would call for investigation of the cause. Coils in originating office match the amplifier to the line. The coils in the intermediate offices are side circuits of a phantom.

XUM

Telephone poles installed on the top and sides of houses were not an uncommon sight in Germany.

THROUGH EUROPE AND MIDDLE EAST BY PLANE

By RAY BLAIN

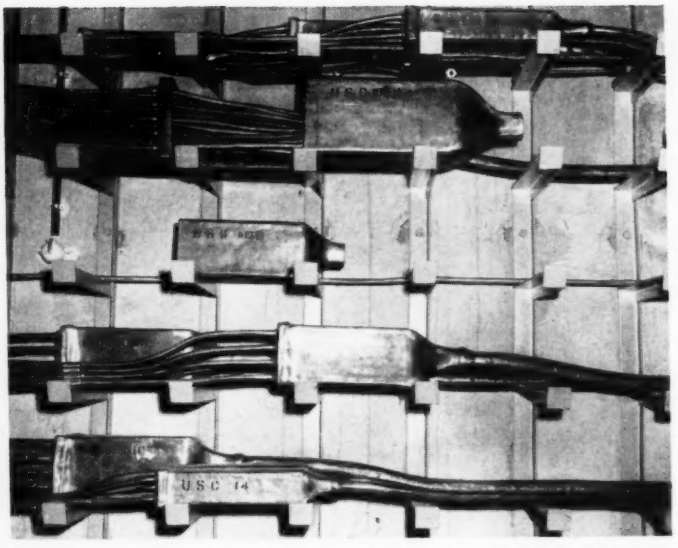
One of the many fine reporting telephones in Germany. Note instructions below.

Part 1

ONCE UPON a time a book was published titled: "On a Slow Train Through Arkansas," and still another "Through Missouri on a Mule," and now I shall attempt to bring the theme up-to-date by telling you about my trip through Europe on a plane. Actually, we also traveled by train, automobile and Jeep, but we were not on a boat of any kind a single time. This trip lasted five weeks and included Germany, France, Italy, Turkey, Greece, Egypt and Ethiopia. It is quite a trick to live out of one's suit case for five weeks, but thanks to nylon and dacron garments we made it. In this connection, however, we have been informed upon good authority that as a laundryman we are a total failure.

We left Washington, D. C., at 3 p.m. on a Military Air Transport Service (MATS) DC-6B, and after flying at an altitude of 18,000 feet—and well above the clouds—for about four hours we sat down at Stephensville, Newfoundland Air Base. This was the first time we had ever ridden backwards in an airplane for any distance. This is a safety measure and it does not cause any inconvenience. As a matter of fact, after you get into the air you actually forget that you are riding backwards.

After a two-hour layover in New-



LEFT PHOTO: Pot head type splice used to connect tipping cables in a German central office vault. RIGHT PHOTO: Cable vault in a French telephone office.

foundland, we flew non-stop to Paris in nine hours flat. It was a smooth flight and it was difficult to realize that we were out over the wide Atlantic with the moon shining brightly on the clouds below. After an hour in Paris, we flew on to Frankfurt, Germany, in an hour and a half. Because of the ever-present clouds we could see very little of the countryside of France and Germany. France, however, appeared to be all small fields designed in a crazy quilt pattern. In Germany, the fields were larger and well laid out, but all roads appeared to run at angles.

We were met by friends at Rhine-Main Airbase at Frankfurt and were driven in a car down the Autobahn to Heidelberg, a distance of about 50 miles. The Autobahn, built by Hitler, is comparable to our turnpikes with the exception that the Germans do not pay toll. The traffic consists of large trucks with four-wheel trailers, small cars, and motor bikes. There is no speed limit and everyone travels like the wind. Serious accidents are not uncommon. The Autobahn and the stadium which was built for the 1936 Olympic Games are, perhaps, the only worthwhile and lasting things that Hitler ever accomplished for the German people. The stadium, which seats 100,000 people, was not seriously damaged by bombing during the war and is being used extensively at the present time for numerous events.

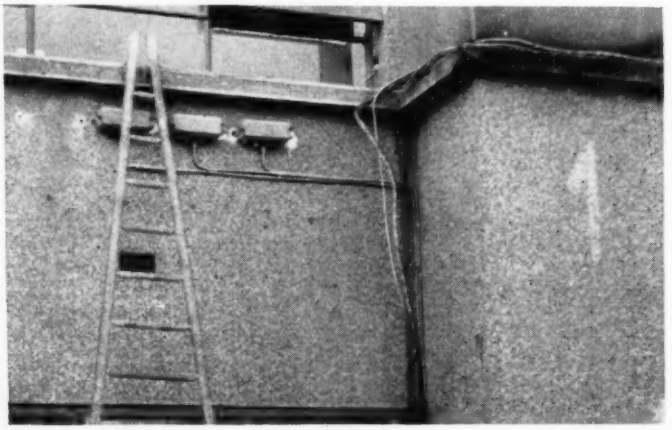
Emergency magneto telephones are located on suitable standards at five kilometer intervals along the Autobahn. These telephones connect into the nearest police station. In the event of an accident, the police are on the job almost immediately. If a car or motor bike runs out of gas, they call the police who in turn get in touch with the nearest auto club trouble car. These three-wheel vehicles tour the Autobahn carrying gasoline, tools and parts, as required, to make emergency repairs.

We spent a most enjoyable week in Heidelberg. The beauty and old-world charm of this city have been sung by poets and artists alike down through the centuries, and, consequently, its fame has spread throughout the entire world. Located along the valley of the Neckar River, with mountains on either side, topped both with old castles and green fields, its beauty is almost breathtaking and certainly presents a picture one does not soon forget.

While in Heidelberg we made several side trips by automobile. One trip covered about 200 kilometers in which we saw much of the German countryside and many quaint old villages. We also visited several old castles. We visited the factories of Siemens & Halske at Mannheim and Bruchsal, and the factory of Mix & Genest at Stuttgart. The officials and workers of these companies were very friendly and showed us various communication developments, all of which proved most interesting.

We caught a train out of Heidelberg, changed to a night sleeper at Frankfurt, and arrived in Berlin the next morning. We awoke at daybreak in order that we might see as much as possible of the eastern or Russian zone of Germany as we rolled up the corridor. Crops were lush and well tended. Buildings appeared to be well maintained, but there was little evidence of new construction. People were moving about, evidently going to work, but they paid very little attention to the American train on which we were traveling. At one point, a branch line railroad was being built out through the countryside from the main line. The railroad and stations all appeared to be in a good state of repair.

All of West Germany is coming back strong, but in this respect Berlin undoubtedly leads the parade. The rubble is fast being replaced with new buildings. Many of these are new and modern office buildings and apartment houses. The shops are all filled with



This photo taken in Germany shows cable terminals with stab in center instead of in end like ours.

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first-class merchandise and the Germans are all buying.

One interesting phase in rubble removal, and German ingenuity, came to our attention. Small particles of bricks and stone which were not suitable for reuse were piled up in a man-made mountain. This had been covered with top soil, seeded, trees and shrubs planted, and made into a beautiful park.

While in Berlin, we were fortunate in being able to make a tour through the Russian Sector. We started down the lovely wide street of the 17th of June, formerly the Koenigsplatz, and now renamed the Platz der Republik, and passed the ruins of the monumental Reichstag where the Nazis and Hitler started their revolution back in 1933. Then we passed the Soviet War Memorial which is an impressive semi-circular sandstone arch with a bronze Red army soldier on top pointing at defeated Berlin. Two Red soldiers stand guard here day and night. Formerly, only one was on guard, but he deserted to the West and for this reason there are now two so that they can watch each other. Next we passed through the Brandenburg Gate, with the Red flag flying on top, and we were in the Russian Sector of Berlin.

The rubble in the Russian Sector has not been cleaned up as it has in West Berlin. Nor is there nearly as much new building construction. We drove through Stalinallee, formerly Frankfurther Allee. This is one section that has been completely rebuilt by the Russians. Most of the old buildings in this area were completely razed by bombing and street fighting when the Red army troops entered Berlin. The style of the new buildings is typical Russian, sometimes called "Moscow Modern." Here, also, is located the Stalin Monument and the Hall of Sports.

Near this area is a large department store which the Communists call H.O., one of a chain operated by the East Zone Government where rationed food and goods may be purchased at inflated prices without coupons. It is claimed that the quality of the goods, judged by United States standards, is very low.

Perhaps the high point of our tour through the Russian Sector was in Treptow Park. The center of this beautiful old park has been converted by the Soviets into a Red army memorial which they call "The Garden of Remembrance." This memorial, beautiful in its simplicity, was designed by Russian architects and built by German laborers working 18 months in day and night shifts. We entered on foot through one of the two huge, gleaming, white sandstone gates erected on either side of the park. We were briefed by our guide not to smoke, talk to or take pictures of anyone in uniform. A wide path, with trimmed hedges on either side, leads to a stone statute symbolizing Mother Russia mourning her sons killed in the Battle of Berlin.

TOP LEFT: German outdoor telephone booth. TOP RIGHT: Typical German pay telephone. RIGHT: Mail box and stamp vending machines are combined with outdoor telephone booth in Germany.

About 80 yards farther on we came to a flight of wide steps where two huge Red flags, carved out of red granite in modernistic style droop forward like curtains drawn aside. Before each flag, a bronze soldier kneels, helmet in hand, head bowed. In the distance, on the summit of a hill, the huge bronze statue of a Red army soldier which stands on top of the Hall of Fame is visible. Steps descend on the farther side, down to an extensive lawn which is divided into five grass plots. Under these, the bodies of 2,000 Red army soldiers, killed in the Battle of Berlin, are buried. Another 600 rest beneath the hill at the end.

We saw many Red army men of various rank and grade who were apparently sightseeing in the Garden of Remembrance. Although they were neatly dressed and mannerly, they were very solemn and I never saw one smile or change facial expression. They did not bother us in the slightest, nor we them. Many carried cameras and frequently took each other's picture. I did not notice any taking pictures of foreigners. I am not certain, but it is possible that a few of them may have gotten within reach of my lens at times though I tried to obey the briefing and avoid this action. The contrast between East and West Berlin is no less than startling. In the West, the American, British and French Sectors are now practically all one and look alike. In the Russian Sector, things look different and are not up to the present standard of the remainder of this prosperous and thriving city.

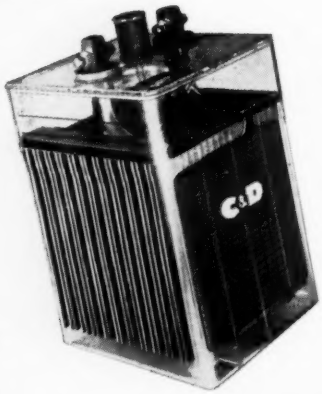
The German people are great lovers of flowers and dogs. If they have a garden spot only 6 feet square, certainly a part of it will be in flowers. Their dogs go with them everywhere, even into the best restaurants and hotels. One big department store in Berlin has a checking station for dogs with an attendant to take care of them. Their dogs are well trained and behaved. Seldom are they on a leash, and they heel to perfection. One army officer's wife remarked that if American children were as well behaved as

(Please turn to page 55)

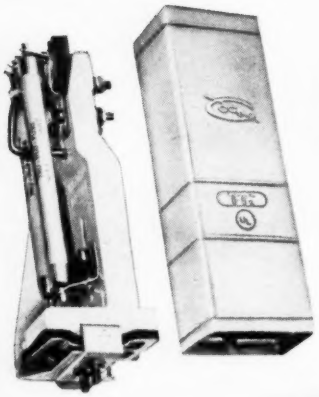
All-star cast of line supplies

featured by KELLOGG

Long Service Life and Low Plant Costs go hand-in-hand with the installation of ENDURPRENE—The Neoprene Drop Wire available in Copperweld and Bronze. This flexible and easy-to-handle wire is made by GENERAL INSULATED WIRE WORKS, INC.



Extra-Long Life!—The suspended and supported plate construction is an exclusive feature of C&D BATTERIES. Choose C&D's PlastiCal (lead-calcium grids) for life expectancy of 25 years. For 14 years expectancy, specify PlastiCell (high tensile lead alloy grids).



A Single Circuit Protector for both indoor and outdoor use. The Type 09U is equipped with Tru-Gap dischargers, carbons, 7 amp. fuses, a porcelain base and a gasket and locking device. A product of COOK ELECTRIC COMPANY.

Mobile Power Unit for use by telephone cable splicing crews, for lighting, operating solder pots, solder irons and electric blowers for ventilating manholes, with a centrifugal or diaphragm pump to keep the manholes dry. S&G MANUFACTURING CORP.

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Simple, Quick and Sure! — For splicing two wires of different sizes, there's nothing simpler than using Nicopress reducing sleeves and the Nicopress 31-DC tool. Splices are always tight and strong. Made by the NATIONAL TELEPHONE SUPPLY COMPANY

"Prospector" Earth Boring Machine! Extra rugged construction — Digging Bar angles to right, left, or forward. Angles better than 45°. Priced in the low-priced field. Ask for a demonstration! WYOMING VALLEY EQUIPMENT.

Versatile Plastic Screw Anchor meets needs of telephone industry. For use in all materials from plasterboard to concrete, indoors and out. Nine sizes for screw sizes 5 through 20 and ¼" through ½" Lag Screws. HOLUB INDUSTRIES, INC.

Cable Placing Shoe — used for guiding cable in raising the cable from the reel to the strand. Strong but light in weight—made of cast aluminum with steel arms and rollers. Locking pins keep shoe on strand. Made by CABLE SPINNING EQUIPMENT CO.

Everything that Kellogg ships is a star in its field. Each item has passed a rigid "screen test" and proved that it can perform well under the most difficult conditions.

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Section 23 (Continued)

Record of Lines to Be Cut Over

A record of extension lines to be cut over, classified by departments, together with information showing the characteristics of each line should be obtained. The information should be transferred to a suitable form (see Form A below) using codes in the miscellaneous column when the item is not covered by the headings. Most of the headings on this form are self explanatory. The following refers to those headings which may need further explanation:

ITEM NO. This column is merely a guide to make possible reference and discussion of specific cases.

GROUP HUNTING. Enter a check mark opposite

extensions arranged for group hunting. Indicate by bracket first and last number in hunting group.

MANUAL. Use code to show whether extension is or is not to have a connector multiple, using MC for manual with connector multiple and M for manual without connector multiple.

RESTRICTED. RC can be entered in this column for extension restricted from reaching central office trunk; RT for extension restricted from reaching tie trunks and RTC for extensions restricted from reaching both central office and tie trunks.

USAGE. Enter under HIGH or LOW the letters O or I, indicating whether the usage applies to outgoing or incoming traffic.

SAMPLE FORM A
Record of Lines to be Cut Over

Subscriber Name
Address

Tel. No.

Date

Sheet No.
Total Sheets

Item No.	Name of Extension User	Dept.	Room or Floor No.	Ext. No.		Bridged Sta. Ext. No.		Line Finder		Characteristics					
				Pres.	New	Pres.	New	Grp.	Term.	Grp. Hunt.	Man.	Restricted	Usage High	Usage Low	Miscellaneous Off Premises, etc.

MISCELLANEOUS. Codes can be entered in this column indicating any other information which may be needed such as: Off-premise extension; extension requiring night service; wiring plans, etc., and explain codes at the bottom of the form. Extensions which are to be assigned consecutive numbers but which are not arranged for group hunting are noted in this column. Such extensions should be grouped together in the extension users space and should be designated to show the first, second, etc., lines in the group.

The following information will be necessary for assignments:

(1) Number and arrangement of PBX switchboard positions, including end position.

(2) Number of line finder groups together with the number of line finders per group; the number of engineered extension lines in each group and the identity of any group to be equipped with less than 200 lines.

(3) Number of connector groups with the number of connectors per group and engineered extension lines in each group. The assignment number of each group and whether it is arranged for hunting.

(4) If manual extension lines are required, their location in the face of the switchboard.

(5) Whether dial operated code calling equipment is to be provided.

(6) If manual conference calling equipment is to be installed, the number of trunk jacks and extension jacks required.

(7) If dial conference calling equipment is to be provided, the number of simultaneous connections needed.

(Section 23 to be continued next week)

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

FOR MANY YEARS past we have advocated inward dialing to large PBX telephone systems. We have frequently been ridiculed for this idea by many good and well-meaning telephone men. However, these men cannot be blamed for their attitude since it is possible that they did not fully realize the power of the dial or how easy it is to educate the public in all phases of its use.

Now it is with considerable pleasure that we note a recent issue of the *Wall Street Journal* in which it is reported that the American Telephone & Telegraph Co. is arranging its company's PBX in New York City to permit Direct Inward Dialing.

This article states further that this system appears so attractive that such giant corporations as General Motors, Du Pont, Southern Pacific, General Electric, RCA, Boeing Airplane Co. and Bethlehem Steel are currently huddling with their local Bell companies in the hope of getting comparable service for their major offices.

We contend that what is good for these big companies is good for the country. Furthermore, we are sincerely pleased that this service improvement is at last being offered to the American public. There is no doubt that in the not-too-distant future all large PBX systems throughout the country will be converted to Direct Inward Dialing.

It is believed, too, that this change will not only improve service, but will probably save the telephone customers at least 80 million dollars a year, and at the same time make many good operators available for more important operating jobs.

•

Mr. W. F. Reeves, of Chilliwack, B. C., Canada, comments as follows on our item in the Aug. 11 issue concerning the annoyance of rushing into the house during the summer months to answer the telephone only to find that the impatient caller has hung up:

"This summer has been a long and lovely one here which has pointed up the problem at our home. It made me think of the possibility of design of a waterproof jack to take portable telephone plugs, with screw cover, similar to the electric outlets that are installed for outside decorative lighting.

"In our particular layout we could use a second set that would normally be plugged in at the hall, moved to the bedside at night, and to the dining room porch when everybody is outside during the summer. I am wondering whether this idea has ever been considered."

In this connection, we have seen weatherproof telephone jacks and there is no doubt that they could be utilized in the manner Mr. Reeves indicates. If, however, any of our readers have a better idea for solving this problem we would be pleased to hear from them.

•

A recent survey indicates that there is a strong trend in new homes toward the use of more than one telephone. More than 875,000 convenience telephones were installed in bedrooms, kitchens, hobby rooms, recreation rooms, and other special locations in the home last year.

This is supposed to bring the total additional residence telephones in the United States to nearly 4,450,000, a big jump over a few years ago.

Nearly a million colored telephones were installed in 1955.

•

Recently a wind storm passed through Virginia and broke off a large tree limb near the Blain residence. This limb broke the light service and the telephone drop into our home. This happened at six o'clock in the evening and at eleven that same night the power company had restored service in spite of the heavy rain.

We pulled up the telephone drop and made temporary repairs in order to restore service and not bother the telephone company that night. The next morning we called the Chesapeake & Potomac Telephone Co. and asked them to make permanent repairs.

They asked us if it would be satisfactory if they made the repairs by 11 a.m. We agreed that it would be, and the new drop was actually in place by nine o'clock.

Some people rave and rant about our terrible public utilities, but, in our opinion, they are among the few people left in this day and age who do a superior job at a minimum cost. And if you don't agree with this then perhaps you have not had your car in a garage for repairs lately, or required service on the refrigerator or vacuum cleaner.

•

There has been a noticeable increase of late in the interest shown in the provision of night depositories in new telephone buildings that are now in the planning stage. This equipment provides a slot arrangement so that customers may pay their bills when the office is closed.

If any of our readers have had experience with this arrangement, we shall appreciate it if you will tell us about it.

•

Recently we have noticed several aerial cable installations where cement-asbestos conduit is placed over the cable and strand at certain points to protect it from fire. This precaution should prove to be good insurance against fire damage and certainly costs less than cable replacement.

•

We obtained a new metal desk in our office recently and when the telephone installer came to move the telephone, he drilled holes in the new desk to mount the connecting block.

This action should not be necessary since it would appear that the connecting block could be mounted by the use of adhesive.

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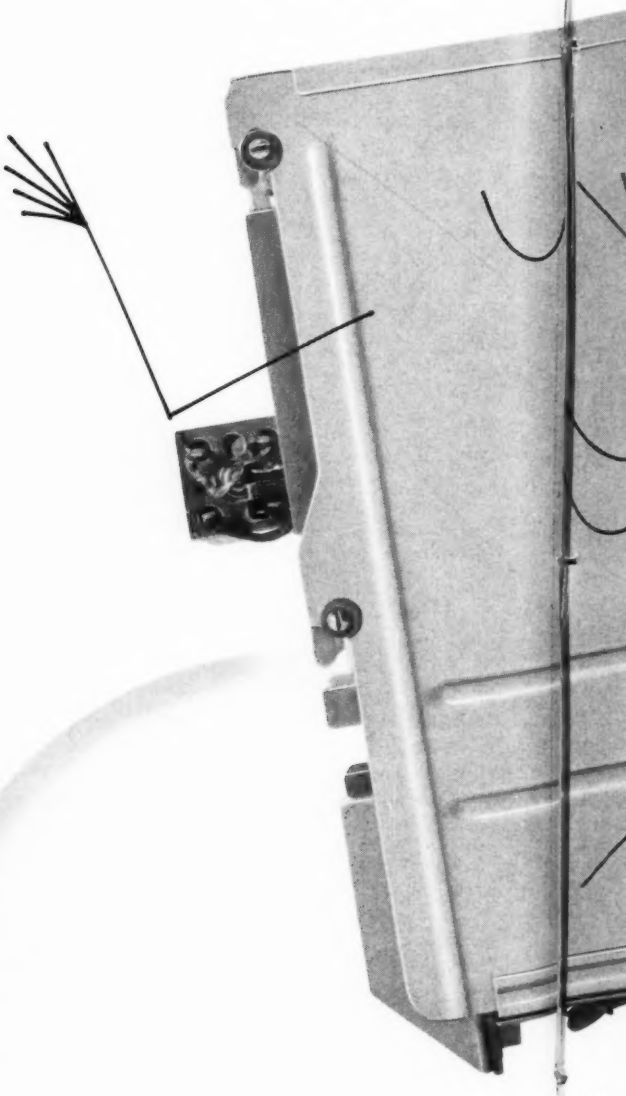
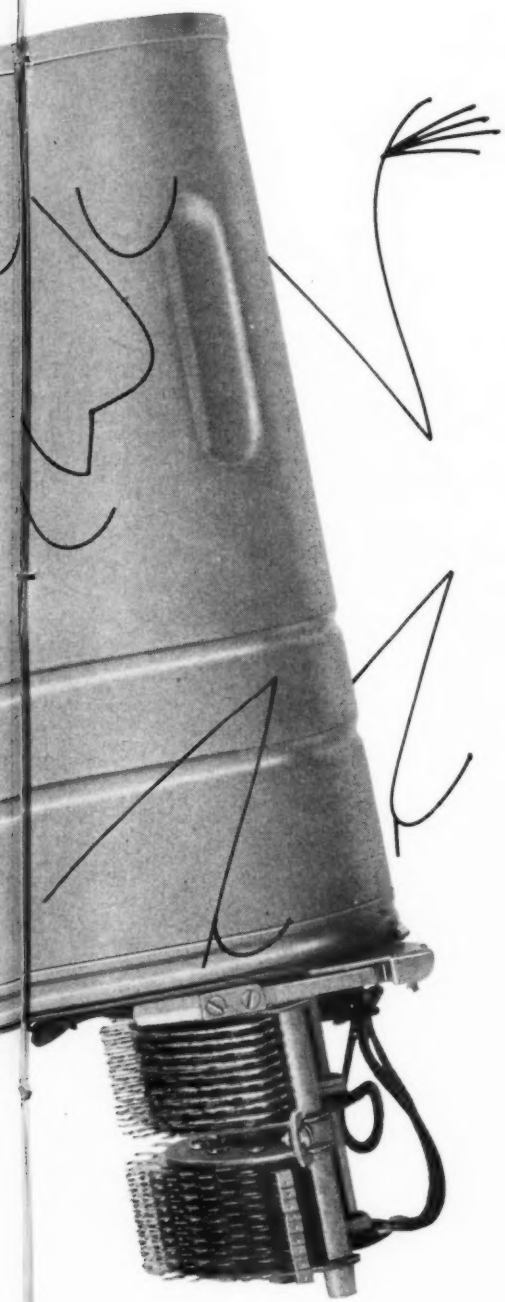
you can make STI



ROWGER do 'most ANYTHING!



STROWGER Automatic is the kind of equipment that will "jump through hoops" for you.

And twenty years from now—or even much sooner!—that fact may prove a lifesaver for your company.

Here's why: In the coming years, your equipment may have to meet requirements far different from today's. If you can't adapt your equipment at a reasonable cost, you will have to replace it.

Of course, if your dial switching equipment is Strowger Automatic, there'll be no problem. You'll merely adapt it to furnish new services—and you'll do the job *economically*.

How can you be sure? Just look at the record! As each new requirement has come... rotary trunk selection, intertoll dialing, "2-5" numbering, automatic toll ticketing, expansion to Director operation... existing Strowger exchanges have been modified to provide them, simply and economically.

You owe it to yourself—and to your investors—to consider Strowger Automatic. Drop us a line today. We'll be glad to help you in any way we can. Address: *Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7. Or call HAymarket 1-4300.*

AUTOMATIC ELECTRIC

ORIGINATORS OF THE DIAL TELEPHONE

GENERAL SYSTEM INDEPENDENT

Courts and Commissions

Ind. Companies Given OKs on Purchase, Financing, Rates

The Indiana Public Service Commission on Sept. 14 authorized the Smithville Telephone Co., Inc., Ellettsville, to purchase the Ellettsville exchange facilities of the Monroe County Telephone Co.

The Smithville company was also authorized to: (1) issue 1,004 shares of common stock, $100 par value; (2) cancel 54 shares of common stock now outstanding; (3) cancel the company's right to issue up to 150 shares common stock to pay Monroe County Telephone Co. for Clear Creek facilities.

The company, in addition, received authority to (1) borrow $337,000 from the REA; (2) establish certain extended area service and (3) upon completion and placing in service of proposed property improvements, to establish the following rates and charges:

One-party business	$10.00
Two-party business	7.50
Multi-party business	5.50
One-party residence	5.50
Two-party residence	4.50
Multi-party residence	3.75

Atlanta Telephone Co. on Sept. 14 also received authority from the commission to increase rates as follows:

One-party business	$4.50
Multi-party business	3.50
One-party residence	3.50
Multi-party residence	2.75

FCC Accepts New Rule on Station Apparatus Accounting

The Federal Communications Commission on Sept. 19 adopted a new rule providing for simplification of accounting for telephone station apparatus for telephone companies under the full jurisdiction of the commission.

The new rule is effective Jan. 1, 1958, but any company may, if it so desires, place it into effect as of Jan. 1, 1957.

The accounting simplification will be brought about by including the investment in station equipment *on the subscriber's premises* in the "service account" under "Telephone Plant"—from the time the equipment is purchased until it is finally disposed of by the company.

Under the present rules, telephone companies are put to the bother of checking such items in and out of various accounts, depending on whether the equipment has been purchased but not installed, or is being temporarily withdrawn by reasons of changes of address, discontinuance, etc.

Under the newly-adopted rule, the investment for such equipment will go into the "service account" from the minute it is purchased until the time it wears out, or is destroyed, or otherwise taken out of service for good.

The change will affect not only subscriber telephone instruments, but also such equipment as telephone booths, small private branch exchanges (manual and automatic) and teletypewriters. This form of continuance accounting, popularly known as the "cradle-to-grave" treatment saves a lot of headaches and expense for the telephone company accounting department.

The second general objective of the new rule is to treat the cost of installation, and of the wiring directly associated with equipment on subscriber premises, as *depreciable* plant. Such cost has heretofore been capitalized, since the virtual beginning of telephone accounting in 1933, as *non-depreciable* property because it was felt, at the time, that treatment would result in relatively constant charges to "operating expenses," so that there would be little if any distortion. The experience has been, however, that the non-depreciable classification (which is the same as "retirement accounting") actually results in fluctuating, expense-distorting charges, particularly for small companies.

The main argument in favor of depreciation accounting for installation wiring cost, under the new rule, is that it will give a greater assurance of properly matching revenues and expenses, and will prevent radical expense increases during periods of high installation or removal of stations.

One of the incidental effects of the new rule change will be that costs of wiring and station installation will be written out of the plant account, *at the time the telephone station with which they are associated is physically removed.* Or, in case of subsequent reconnections without physical removal, incidental loss due to disconnection would be written out at the time of reconnection. The present FCC accounting calls for delaying book retirements of station connections until physical removal of the station itself, but in case of reconnection the additional cost is charged to operating expenses. The new change should save time, effort, and expense in the bookkeeping department.

A special committee of the United States Independent Telephone Association, as well as representatives of the Bell System and the Committee on Accounts and Statistics of the National Association of Railroad and Utilities Commissioners, worked closely with representatives of the Federal Communications Commission in connection with the rule change. The USITA urges all Class A and B Independent telephone companies to take steps promptly to revise their accounting procedures to bring them into line with the amended accounting regulations by next Jan. 1, as permitted in the order. Although a number of the Class A and B companies are not subject to the jurisdiction of the FCC, it is felt that they will want to obtain the benefit to be derived by revising their accounting procedures accordingly, provided that such action is in accordance with agreement by their state regulatory body.

The FCC order can be obtained from the Government Printing Office at 15 cents per copy. Orders for copies of the *Federal Register* should be addressed to the Government Printing Office, Washington 25, D. C., and accompanied by a check or money order payable to the Superintendent of Documents.

Mo. Commission Approves Sale of Eight Exchanges

The Missouri Public Service Commission on Sept. 25 approved a transfer and improvement program for

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eight telephone exchanges in northern Missouri (TELEPHONY, Sept. 15, p. 33).

In one case, the commission granted Chariton Valley Telephone Corp. the right to buy from Western Light & Telephone Co. of Great Bend, Kan., the exchanges at Atlanta, Bevier, Callao, Clifton Hill and New Cambria. The exchanges would be converted to automatic.

To finance the purchase and improvements, Chariton was granted permission to borrow an additional $706,000 from REA, making its maximum loan from the REA $1,300,000.

In another case, Grand River Mutual Telephone Corp. was authorized to buy from Western the exchanges at Browning, Linneus and Meadville. They also would be improved to automatic operation through an REA loan of $481,000.

W. Va. Independent Asks Increase in Tariffs

A hearing on proposed increased rates for the Flemington Telephone Co. was set by the West Virginia Public Service Commission to be held on Oct. 15.

Rates requested for the company's Flemington and Volga exchanges are:

One-party business	$6.00
Two-party business	5.00
Rural business	4.50
One-party residence	4.50
Two-party residence	3.75
Four-party residence	3.50
Rural residence	3.50

N. D. Commission Approves Increased Rate Schedule

The North Dakota Public Service Commission has authorized the Bowman-Slope-Rural Telephone Mutual Aid Corp. to construct and operate facilities in Adams County and to adopt an increased rate schedule, it was reported recently.

The corporation proposes to establish an automatic exchange at Bucyrus to serve an estimated 225 subscribers after a five-year development period, in Harding and Perkins counties in South Dakota as well as in Adams County in North Dakota.

Rates approved by the commission include: One-party business, $7.65; one-party residence, $5.55; two-party residence, $5.10; four-party residence, $4.70, and rural multi-party, $6.50.

Tex. Supreme Court Remands Two General Rate Cases

In a decision which may have far-reaching effects on telephone rate-making in Texas, the Texas Supreme Court on Oct. 3 reversed the decisions of the district courts and appeals courts denying General Telephone Co. of the Southwest, San Angelo, Tex., temporary injunctions in the Wellington and Eden rate cases and remanded the two cases to the respective district courts.

In both Wellington and Eden, General had asked the city councils for rate increases. The Eden city council turned the rate adjustment request down completely while in Wellington a small increase was granted.

General then went to the district courts asking injunctions restraining the cities of Wellington and Eden from enforcing their present rate ordinances and allowing the company to raise telephone rates. Both District Judge O. L. Parish and District Judge Luther Gribble turned the requests for temporary injunctions down. Their rulings were upheld by the Civil Appeals Courts.

In the Wellington case, the city argued against the granting of a temporary injunction claiming the company should separate its revenues and expenses for the portion of the Wellington exchange within the city limits from the part of the exchange outside the city for rate-making purposes. Another question in the case was whether or not the rates granted by the city which yielded a return to the company of less than 2 per cent on the fair value of the company's Wellington properties were confiscatory.

The opinion on the supreme court's findings, written by Associate Justice W. St. Johns Garwood, stated in the Wellington case that "the single exchange system for the whole community has always been in actual use and there is no suggestion in the record that such a method of operation and accounting was followed in bad faith or in the least degree against the wishes of the city or that it involved improper discrimination in any respect." It added that any breakdown between city and rural lines would "be considerably more theoretical and unnatural" and that "to find a sound and practical basis for splitting up for rate-making purposes such a naturally indivisible business enterprise into subunits somehow following city lines would seem to be impossible."

On the question of the company's return of less than 2 per cent on the fair value of its investment in Wellington, the supreme court held that "a return of less than 2 per cent obviously qualifies as unreasonable under existing economic conditions of general knowledge as well as under the uncontested proof made at the hearing in this case."

The supreme court also cited the fact that "no inconsistencies or omissions in the company figures" had been found.

The Eden case was similar to the Wellington case in the city's contention that rural and urban investment, revenues and expenses should be separated but differed to the extent that in Eden the company contended it was realizing an actual out-of-pocket loss from its operations. The Eden decision referred many times to the Wellington ruling concerning these arguments.

Additional points in the Eden case were the city's claim that the quality of service in Eden was poor and that the general area was suffering the adverse effects of a prolonged drought.

On the question of service, the court stated that "indeed, it would not be unnatural if the entire exchange were somewhat 'antiquated' considering that admittedly there has been only one increase in rates granted—amounting to 33.5 per cent—since 1927, that is, in a period of some 28 years up to the time of trial, during which it is common knowledge that there has been an increase of business costs of almost every kind, including wages, construction and materials and taxes, amounting to far more than 33.5 per cent."

Concerning the drought, the court ruled that "no authority is cited and we know of none which entitles courts to refuse injunctive relief against inadequate rates because some or even all of the customers of the utility in question may at the time be less able to pay the proper charges than they ordinarily would be."

Another contention of the city of Eden was that General is suffering no over-all company financial hardship since the company is in the 52 per cent income tax bracket. In answer to this argument, the Supreme Court stated that "the 52 per cent income bracket, of course, includes all corporations, however large their investment, that earn over a total of $25,000 per year and thus has no significance as to corporate prosperity or adversity even in general, still less with respect to a particular subdivision of the corporation such as the Eden exchange."

Ohio Commission Sets Line Extension Rules

The Ohio Public Utilities Commission has announced that it is of the opinion it should adopt rules and regulations concerning "excess construction charges" to be paid by the subscriber or subscribers, which charges are applicable to certain line extensions of the telephone companies operating in Ohio. Therefore, it has called a hearing on Oct. 25 at which all interested

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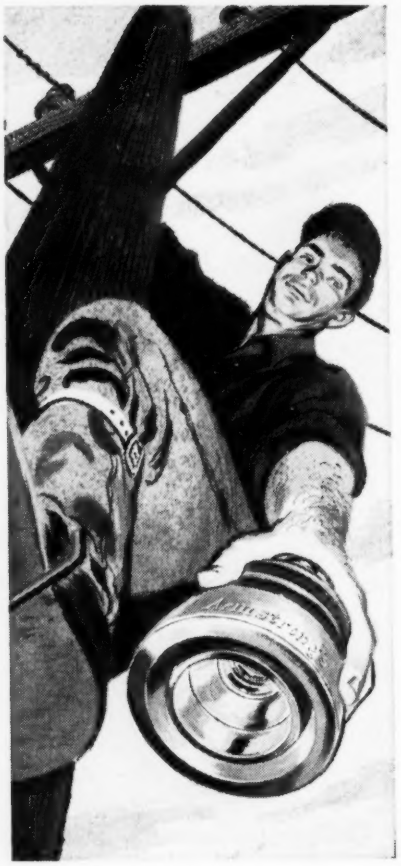

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parties will be given an opportunity to be heard.

The contemplated rules and regulations, are to cover maximum construction charges for certain line extensions that are applicable to permanent facilities on public highways outside the base rate area of an exchange, and are as follows:

(1) Where a telephone company constructs permanent facilities on public highways, in order to furnish service to an applicant or applicants in the territory where no facilities are available, the maximum construction charges applicable shall be determined in the following manner regardless of the actual route to be followed by such construction.

(a) When an applicant or applicants are to be furnished service, the length of construction required to reach the point of entrance of the applicants' private property, measured along the public highway either from the nearest existing distributing plant of the telephone company or the nearest point to which the telephone company plans to extend its facilities under an approved construction program, whichever is closer, shall be determined.

Where the length thus determined does not exceed one-half mile per applicant, no construction charges to the applicant will apply. Where the length thus determined does exceed one-half mile per applicant, the applicant or applicants may be required to pay construction charges equal to the estimated expense which would be incurred for installed plant, if a pole line type of facility is used, and for excavation and fill-in if a buried wire or buried cable type of facility is used, for the length in excess of one-half mile per applicant.

Generally speaking, the following policies of that part of plant furnished by the company obtains:

One-half mile
One-quarter mile
An amount equal to a certain number of years the annual revenue.
Five poles
One pole
Miscellaneous—none or all or various other policies.

Approve Rates for Two Ga. Companies with REA Loans

New rate schedules for two REA-financed Independents—the Comer Telephone Co. and the Byron Telephone Co. —have been approved by the Georgia Public Service Commission.

As part of its findings in the Comer company application, the commission on Sept. 27 noted that in a companion order the company was granted authority to borrow funds from REA and to issue additional equity securities for the purpose of buying the telephone properties of the N. D. Arnold Telephone Co., consisting of the Crawford, Lexington and Winterville exchanges.

The Comer company plans to expand, rebuild and convert these properties to automatic operation. It also proposes that the rebuilt system will consist of two exchanges—at Lexington and Winterville — and that the Crawford exchange area will be divided between the two new exchanges. Then the new exchanges will provide extended area service throughout the system, the Winterville exchange also offering EAS to the Athens, Ga., exchange of Southern Bell Telephone & Telegraph Co.

Winterville and Lexington exchange rates effective upon the above-described conversion and rehabilitation are:

	Winterville	*Lexington*
One-party business	$8.50	$6.50
Two-party business	7.50	5.50
Four-party business	6.50	4.50
One-party residence	5.00	4.50
Two-party residence	4.25	3.75
Four-party residence	3.50	3.25
Rural business	5.00	4.50
Rural residence	4.00	3.50
Urban service extended to rural area per ¼ mile or fraction thereof beyond base rate area:		
One- party	0.40	
Two-party	0.20	
Four-party	0.10	

The Byron Telephone Co., in addition to being authorized to borrow from REA, also gained approval of a cumulative preferred stock issue—100 shares of $100 par, 5 per cent—and a common stock issue of 100 shares of $100 par.

New rates are to take effect when extended area service (between the Byron and Macon exchange areas), conversion to automatic, and expansion plans are completed in the areas served; these rates are:

One-party business	$10.65
Two-party business	9.40
Four-party business	8.15
One-party residence	4.90
Two-party residence	4.05
Four-party residence	3.25
Rural multi-party flat rate:	
Business	5.50
Residence	4.50
Urban service extended to rural area—per ¼-mile or fraction thereof:	
One-party	0.40
Two-party	0.20
Four-party	0.10

Four Ohio Independents Request Increased Rates

The Ohio Public Utilities Commission was to hear testimony on Sept. 25 relative to the $732,961 increase asked by the Mansfield Telephone Co.

Three other Independents who have asked increases, but for whom hearing dates were not yet set are: The Mount

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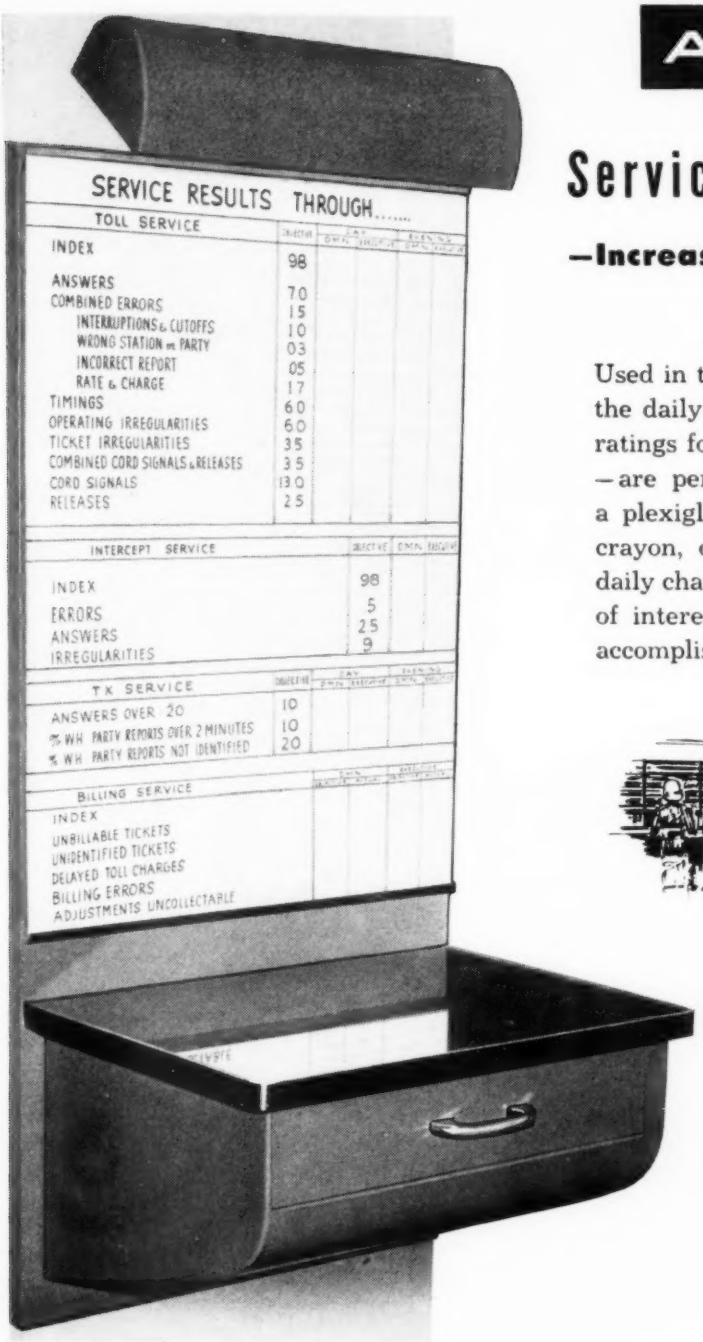

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—Improve service

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EASY TO MAINTAIN

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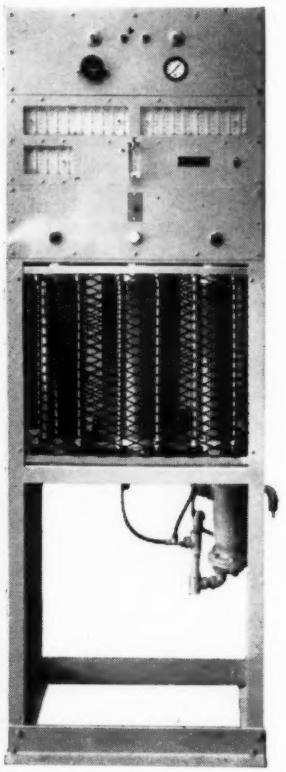

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Vernon Telephone Co., $180,972; United Telephone Co., Bellefontaine, $295,801; and Chillicothe Telephone Co., $425,123.

Separation Studies Ordered For Bell in Mississippi

In connection with its consideration of Southern Bell Telephone & Telegraph Co.'s petition for a 2.5 million dollar increase in intrastate telephone rates, the Mississippi Public Service Commission moved on Oct. 2 to break down into separate items the company's intrastate and interstate properties, revenues, expenses and taxes (TELEPHONY, Aug. 4, p. 36).

Chairman Rubel L. Phillips announced that Curtis Bushnell of Baltimore, Md., had been retained by the commission as a special consultant to undertake the separation. Bushnell testified recently before the Pennsylvania Public Utility Commission in a similar capacity.

The Mississippi commission has heard testimony by witnesses for the company and is now studying it. State witnesses will be heard at a later date, and a decision on whether to allow the rate increases asked by Southern Bell is expected about Dec. 15.

Meanwhile, the company, under a new 1956 state law, has put requested increases into effect without permission of the commission. If the raises are not allowed by the commission, then the company, under bond, must return the excess charges to its customers.

Neb. Commission Declares Territory Open, Sets Rates

The Nebraska Railway Commission on Oct. 2 declared the area served by the Addison Telephone Co., Bloomfield, as "open territory," following complaints from subscribers. The commission had ordered the company to make improvements in its service and facilities. The company did not comply with the order by an Aug. 1 deadline.

In other orders the commission established a 10-cent rate for local calls from paystations at South Sioux City, Neb.; approved rates for the Cuming County Telephone Co. for loud speaking telephones, colored sets and electronic secretary; and granted a small rate increase for one-party service at Campbell. Extended area service for the Campbell company was discontinued except to Bladen, Norman and Upland.

Ill. Commission to Hear Pleas to Sell, Issue Bonds

The Illinois Commerce Commission has reported that Manhattan Telephone Co. seeks permission to sell its tele-

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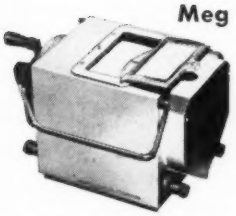

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Cat. No.	Scale Ranges	Price
569	0-30 and 0-300 ohms	$270.00 each
571	0-60 and 0-600 ohms	270.00 each
573	0-300 and 0-3000 ohms	270.00 each

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A compact, easy-to-study, vacuum-tube volt-ohmmeter, which gives easy-to-read readings of power-level, AC-DC voltage and resistance. Supplied with ground lead, eight-foot power cord and test probes with removable alligator clips.

Cat. No.	Description	Price
S-7687	Type 71 Multi-Meter	$84.50 each

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The Shallcross 6105 C-L-R Fault Location Bridge is a capacitance resistance, and inductance bridge for direct, or comparison, measurements. Wheatstone bridge may be connected for loop, Murray or Varley test. Transistor oscillator and amplifier are powered by self-contained battery—which makes this a compact and portable test set.

Only one switch, for rapid change of range and uses. Decade switches are eliminated, values read on ONE precision potentiometer dial. Calibrate knob permits recalibration balance of Wheatstone Bridge from panel. Use operator's headset when making capacitance measurements, no other accessories required.

Cat. No.	Type	Price
6105	Shallcross 6105 C-L-R Bridge	$190.00 each

Prices are F.O.B. Chicago, and subject to change.

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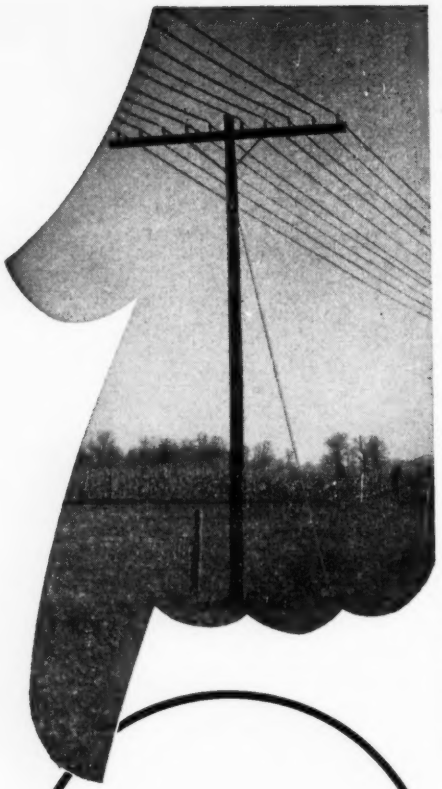

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phone properties and operating rights to Illinois Bell Telephone Co. A hearing on the joint petition of the two companies was scheduled for Sept. 27. The Manhattan company serves 615 subscribers.

In the petition, Manhattan said it lacks capital to convert its manual-magneto system to automatic. Bell said it plans to install a modern automatic system. In the meantime, Bell said its rates for principal classes would be like those charged in comparable exchanges.

Middle States Telephone Co., on Oct. 11 was to have a hearing on its application for authority to issue 2 million dollars principal amount of additional first mortgage bonds.

Sets N. C. Airport Boundary For Bell and Independent

The North Carolina Utilities Commission on Oct. 2 issued an order establishing a boundary line in the Raleigh-Durham Airport area between the Raleigh exchange of Southern Bell Telephone & Telegraph Co. and the Durham Telephone Co.

Approximately 43 people residing in the area had petitioned for service from Raleigh, and at least four were named in the order as having applied for service from Durham.

In setting the service boundary, the commission said that persons living in the area should be allowed service from Southern Bell's Raleigh exchange since all of the children of public school age in the area are assigned to school in Cary, which is served by the Raleigh exchange without toll, that a majority of the people in the area receive medical attention in Raleigh and Cary, and that the entire area is under the Wake County sheriff's office in Raleigh for police protection.

The commission ruled that three homes in the area which now have telephone service through the Durham exchange will be allowed to keep it.

The order does not affect service at the airport or business establishments on the airport property, since they have both Raleigh and Durham telephones.

Three Ohio Companies Given Approval on Financing

Security issues recently passed by the Ohio Public Utilities Commission were to:

The Conneaut Telephone Co. for authority to sell $100,000 no par common stock, 1,000 shares at not less than $100 per share; to sell $100,000 of its $100 preferred stock, 1,000 shares of not less than $100 per share; and to issue $100,000 principal amount of five-year notes at an interest rate not in excess of 5 per cent. The proceeds from the sale of the securities are to be used to reimburse the applicant's treasury for capital expenditures.

The Lorain Telephone Co. for authority to sell for cash 2,000 shares of its 5 per cent preferred stock at $102 per share, aggregating a total of $204,000; to sell for cash 4,994 shares of its no par common shares at $25 per share, aggregating a total of $124,850; to issue 3,026 shares of its no par common stock with a stated value of $25 per share, aggregating a total of $75,650, as a stock dividend on the basis of one dividend share for each 33 shares of common stock held, but no fractional shares to be issued; and to transfer the sum of $75,650 from its earned surplus account to its common stock account.

The Ashtabula Telephone Co. for authority to offer for sale to the holders of the company's presently outstanding 50,000 shares of common capital stock pro rata 10,000 shares of its common capital stock having a par value of $25 per share, on the basis of one share of new common stock for each five shares of presently outstanding stock, to be offered at a price of $28.50 per share. The proceeds from the sale are to be used to reimburse the applicant's treasury for capital expenditures.

Asks Reduction of Mileage Charges in Pennsylvania

The Enterprise Telephone Co., New Holland, on Oct. 1 asked the Pennsylvania Public Utility Commission to approve a $2,722 annual rate reduction for its 326 subscribers, effective Dec. 1.

The reduction would come from lowering mileage charges for 270 New Holland and 56 Leola subscribers.

OK Ohio Independent Sale

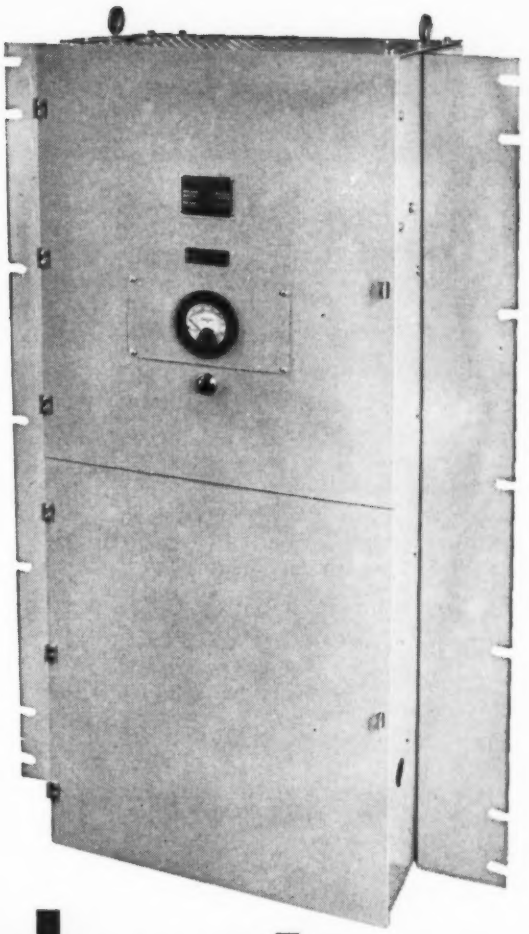
The Lucas Telephone Co., operating one exchange with approximately 380 stations, has been authorized by the Ohio Public Utilities Commission to sell its plant and assets to Gilbert McQuate.

Ind. Paper Carries Feature On Veteran Telephone Man

Tully Pontious, veteran telephone man of 61 years of service with the Rochester (Ind.) Telephone Co., was the subject of an interesting feature story in a recent issue of The Rochester *News-Sentinel.*

Mr. Pontious is still semi-acitve in the work of the company, and is a member of the board of directors. He recently celebrated his 86th birthday.

NEW



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IN THE NATION'S CAPITAL

Concluded from page 22

television channel in a matter of a few seconds!

This gives us some idea of the way, in theory at least, information can be compressed and handled by the use of codes and systematic electronic transmission.

So far, of course, all this is theory. No such machines are yet in operation. They would have to be figured out and then built. But, the present knowledge of electronic art and the communication art is sufficient to warrant the assumption that such things can be done, and will be done, sometime not too far distant.

These technical theories hold great promise for the future of the communications business. With channels and frequencies becoming scarcer and the demands for the use of them increasing constantly, we will need all of these short cuts and techniques to handle the sum total communication load of the future years.

Doubtless these techniques would have a considerable effect not only on the amount, but also the *kind* of telephone plant which will be used, for some purposes at least—perhaps within another decade. These techniques will naturally have an effect on the growth of automation in the communication business and on the speed and effectiveness of transmission.

[**EDITOR'S NOTE:** *It is for the reason that we feel all telephone men should be acquainted with the fundamentals of electronics and its present and future applications to the telephone art, that* TELEPHONY *inaugurated its new "Electronics Section" in the Sept. 29 issue. It will be published once a month. Mr. Welch's discussion here emphasizes the importance of electronics in the telephone field and we urge all telephone men to follow our "Electronics Section" every month.*]

Outside of the communications field, these theories and techniques may be employed most dramatically in future years. Right now, the Naval Research Laboratory, here in Washington, is using them to figure out the expected positions for the tiny man-made moon slated to be launched next year. A few years hence, they might even be employed for contacting the moon itself or even beyond that.

REA Loan Ends Duplicate Service

A recent REA loan is expected to eliminate five of 11 remaining situations where duplicate telephone service exists in the same exchange area. REA has authorized a loan of $1,360,000 to the Delta County Cooperative Telephone Co. of Paonia, Colo. Delta Cooperative plans to use the loan to improve service for 2,229 existing subscribers and to furnish initial service to 494 new rural subscribers. The area is Delta, Gunnison, and Montrose counties, where the services of the co-op overlap those of Mountain States Telephone & Telegraph Co. (Bell company) in western Colorado.

Many residents in this area have been subscribing to both systems. However, the two companies (the Bell company and the REA co-op) have agreed to end the duplication as soon as construction proposed with REA loan funds is completed in the borrower's area. Each will relinquish a portion of the overlapped service to the other. Outside plant in the relinquished area will be put up for sale to the other. Mountain States has agreed to furnish toll connections for the cooperative and to sell the co-op existing Mountain States toll lines in the area. Only about six other community situations throughout the nation remain where two telephone services are rendered within the same area. In past years these situations have been steadily reduced by regulatory action and intercompany negotiations.

Anti-chiseling Laws

Your correspondent had a red face for failing to make an important correction in connection with a recent item in this department (TELEPHONY, Sept. 1, p. 19) about so-called anti-chiseling laws in 47 states. This item was based on a news story, properly credited to *The Wall Street Journal*, which stated that 47 states have passed laws since April, 1955, to punish abuse of long distance service by chiseling subscribers placing phony incomplete person-to-person calls to avoid payment of tolls.

The Wall Street Journal item apparently confused statutory laws with filed tariffs which actually have the effect of law. This writer should have pointed this out. Actually it would be just about impossible to get the same law adopted by 47 state legislatures within a year, even if they were willing to do so without any delay or argument. Most of the state legislatures do not even meet every year.

The net result is the same, of course, even without any expressed statutory law on the subject. If a telephone company files a tariff, which is quite generally permissible, and if that tariff states that anybody caught chiseling on toll calls will have their service

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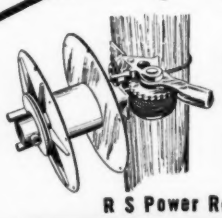
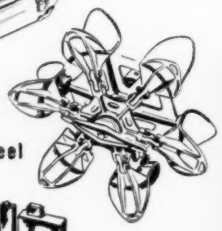

R S Power Reel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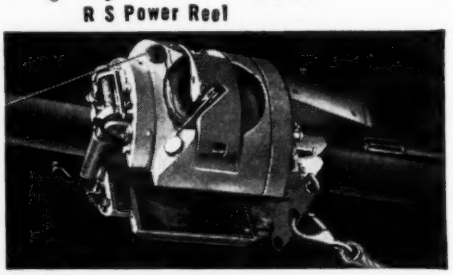

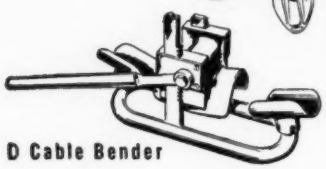
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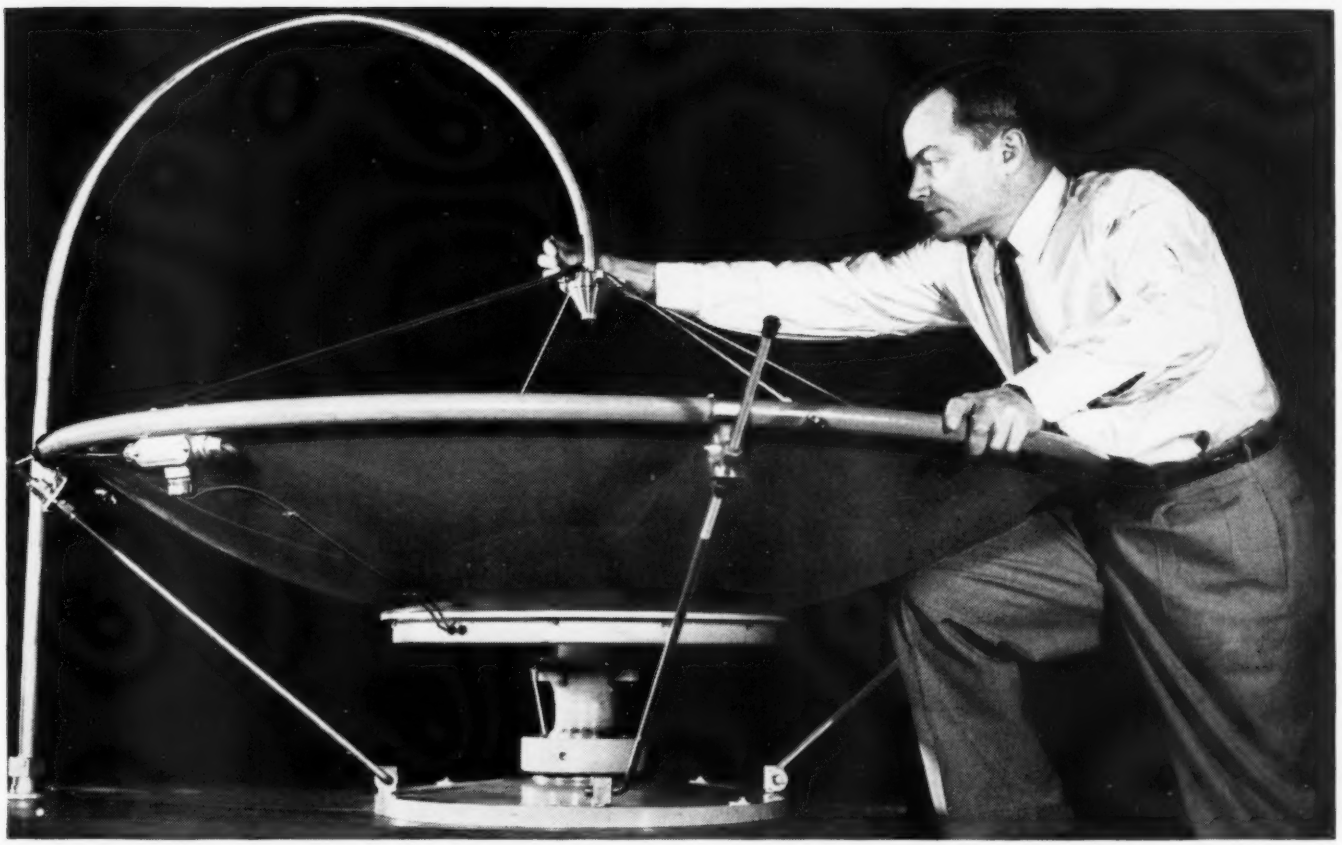

Bell Laboratories' Dr. J. W. Fitzwilliam adjusts a waveguide feed to a parabolic dish reflector. Dr. Fitzwilliam, who has a Ph.D. in physics from Massachusetts Institute of Technology, leads the practical development of Bell's new 11,000-mc. system. Components had to be developed to operate in a frequency band not previously utilized.

The giant microwave highway that carries your TV programs along with telephone conversations from coast to coast has a versatile new partner — an entirely new microwave system which was created, and is now being developed, at Bell Laboratories. The new system operates at 11,000 megacycles — a much higher frequency than ever before used in telephone service.

Bell's present microwave systems — operating at 4000 megacycles — were designed for heavy traffic and long distances. The new system is designed especially for lighter traffic and shorter distances—up to 200 miles. Its traffic capacity is extremely flexible. Depending on traffic needs, the system can provide only one one-way or as many as three two-way broadband channels. Each two-way channel can carry 200 telephone conversations simultaneously or one television program in color or black and white in each direction along a route. The new microwave system, which is already being operated experimentally, will be valuable in providing additional telephone service and television programs for cities in remote areas.

This is another example of how research and development work at Bell Telephone Laboratories help the Bell Telephone System to serve you better.

Mr. L. C. Tillotson, who originated the new system, adjusts the klystron-isolator combination which made the system feasible. Mr. Tillotson, an M.S. from the University of Missouri, is in charge of research in microwave applications.

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cut off, that is law as far as the chiselers are concerned. They can be cut off. Of course, such tariffs are generally subject to review, modification, or change by the public service commissions for good cause or on complaint. But as a rule, where service tariffs are filed in reasonable and proper form, they generally stick. No special statute is needed to take care of such a situation.

USITA Reports Independent's Growth Exceeds Bell's

The United States Independent Telephone Association member letter dated Oct. 5 points out the fact that during the past 10 years the Independent telephone industry has experienced a more rapid rate of growth than the Bell system, with the exception of station gain. The various increase percentages listed for the period 1945-1955 are:

	Independent	*Bell*
Telephones	75%	78%
Gross revenues	196%	151%
Average daily conversations	93%	60%
Plant investment	211%	145%
Employes	48%	24%

These pertinent facts and other information are found in USITA's "1955 Statistics of the Independent Telephone Industry." Copies of the publication are available at $2.00 each. A second volume, carrying detailed statistical information concerning 406 companies, can be bought by reporting companies for $5.00, and non-reporting companies for $8.00, the USITA stated.

Obituary

BURRITT S. HUBBARD, 65, president of the Ashtabula (O.) Telephone Co., died in Ashtabula on Sept. 21, after a short illness.

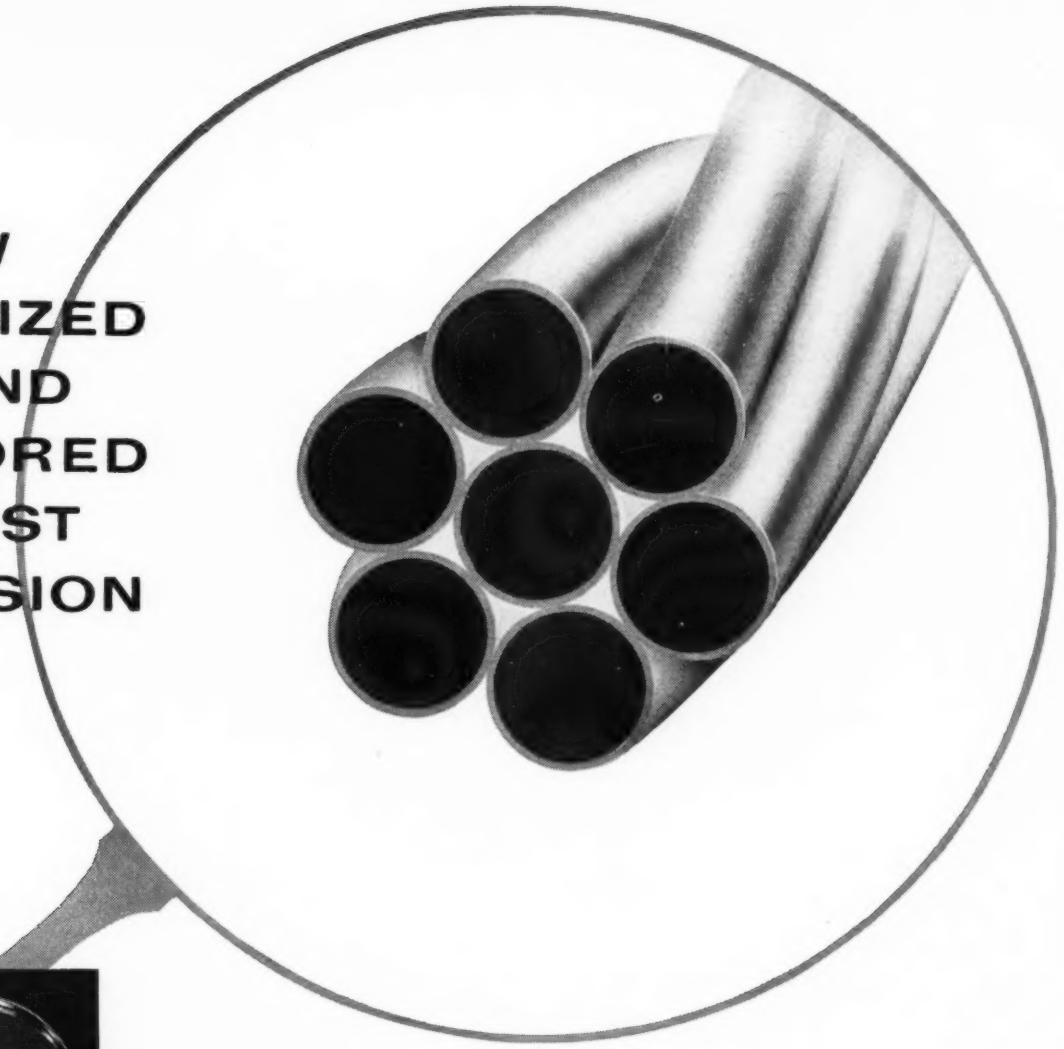
Mr. Hubbard was elected to the board of the Ashtabula Telephone Co. in November 1937. He was elected vice president in April 1944, and succeeded to the presidency in May 1944.

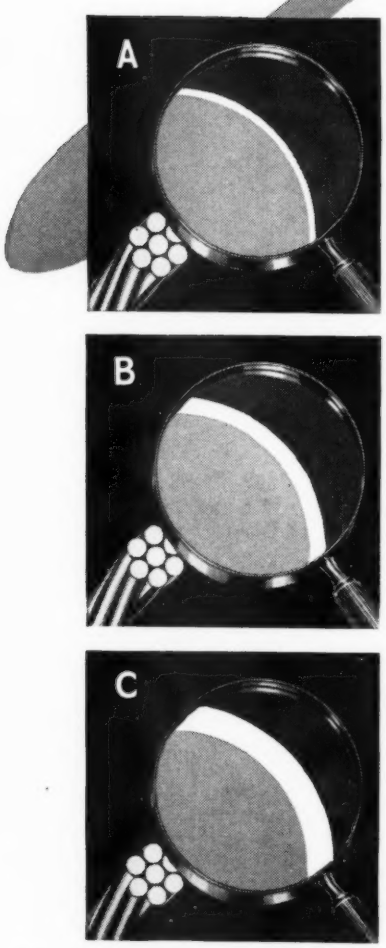
Born on Jan. 29, 1891, Mr. Hubbard attended Ashtabula public schools and graduated from Phillips Exeter Academy in 1911.

Mr. Hubbard started in business in 1913 with his father at the time the Ashtabula Corrugated Box Co. was founded and continued with that company until 1952, serving as its president since 1924. He was also chairman of the board of the National Bank of Ashtabula.

He is survived by his widow, Elizabeth, and by three children, Burritt S., Jr., Ashtabula; Katherine Bell of London, England; and Carrie Adams of Columbus; two brothers, George C. of Ashtabula and Buckley of Erie, O.; one sister, Nancy Lance of Painesville, O., and five grandchildren.

HOW BETHANIZED STRAND IS ARMORED AGAINST CORROSION





The job of armor is to protect. In the case of steel strand, the armor is the protective zinc coating that encases every wire. But some zinc coatings are better than others, and therefore cost less in the long run. A great many buyers, with an eye on the budget, have now standardized on Bethlehem strand with the bethanized zinc coating.

Bethanizing is a very successful process developed by Bethlehem—a process that bonds the zinc to the strand by an electrolytic method. The coating thus produced is so uniform and ductile that it will resist cracking or peeling under severe deformation. This is the best possible protection against moisture and other corrosive influences.

Furthermore, the bethanized coating offers another great advantage to users. It is available in three different weights—A, B, and C. Coating A is equivalent to extra-galvanized. B is twice the thickness of A. The heaviest, C, is three times the thickness of A. In price, there isn't a great deal of difference. Thus the user can select a coating that exactly meets his needs, and can, at the same time, keep his costs from going sky-high.

There's much more to be told about bethanized strand. Space prevents our telling it here. But if you'll call our nearest office, a Bethlehem man will be glad to give you the full story. It makes good listening.

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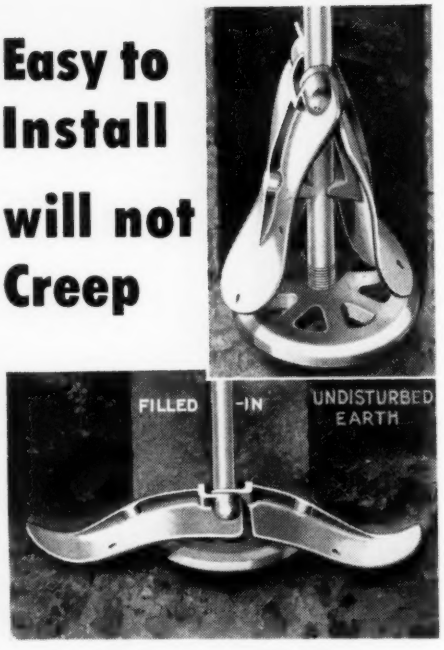

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REA APPROVES 15 LOANS

Continued from page 23

The Maine borrower plans to use the funds to serve 14 additional subscribers, to construct a new headquarters building in Bar Mills, and to complete construction authorized in the first loan.

The two loans totaling $495,000 will make possible improved service to 1,126 rural subscribers. Automatic offices will be located at Bar Mills and Waterboro.

Samuel B. Shepard is president of the Saco River company.

*

Shiawassee Telephone Co., Perry, Mich.; $360,000 (Sept. 27).

The new borrower, a mutual-type organization, proposes to use the loan to convert to automatic and to provide initial service for 451 rural subscribers. At present the system furnishes magneto and common battery service to 576 subscribers.

New construction planned includes an automatic central office in Perry and 27 miles of line. President of the organization is Russell Brandt.

*

Twin Valley-Ulen Telephone Co., Twin Valley, Minn.; $564,000, first loan (Sept. 27).

The borrower is a commercial company which plans to use these funds to furnish telephone service for 382 families and other rural residents now without telephones, and to improve service for 945 existing subscribers. At present the company serves 816 subscribers. Automatic central offices are located at Flom, Gary and Ulen, and magneto and common battery facilities in Twin Valley. In addition, the borrower plans to acquire through issuance of stock the telephone facilities in and around Waubun providing magneto service to 129 subscribers.

Construction scheduled includes an automatic central office at Waubun, and a headquarters and automatic exchange office building in Twin Valley, as well as 258 miles of line. The present automatic facilities at Flom, Gary and Ulen will be utilized in place in the expanded system.

A portion of the loan will be used to refinance existing indebtedness. Carroll C. Arvig is president and manager.

*

LaBelle (Mo.) Telephone Co.; $254,000, first loan (Sept. 27).

The borrower will use these funds to convert its existing system to automatic operation, and to add facilities to serve 87 farm families now without telephones. At present the borrower is providing magneto service to 452 rural subscribers.

Construction planned includes an automatic central office building, and 49 miles of line. The present building will be remodeled for use as the company headquarters in LaBelle.

Guy G. Thorne is president and manager of the LaBelle Telephone Co.

*

Goodman (Mo.) Telephone Co.; $96,000, second loan (Sept. 27).

The borrower plans to use part of these funds to serve 135 farm families now without telephones. Also the loan will cover the additional cost of a combined automatic office and headquarters building instead of an automatic office building only as provided in the first loan. In addition, the loan will be used to complete construction of the system originally authorized.

The two REA loans, totaling $224,000, will make possible automatic telephone service to 572 rural subscribers.

Roy W. Eppard is president and manager of the Goodman company.

*

Farmers' Mutual Telephone System of Shenandoah County, Edinburg, Va.; $2,140,000 (Sept. 27). This is the largest REA telephone loan made in Virginia.

The borrower plans to use the loan to provide telephone service for the first time to 1,289 families in its area and to improve service for 3,496 existing subscribers. At present Farmers' Mutual is furnishing common battery and magneto service over 155 miles of line through central offices at Edinburg, Mt. Jackson, New Market, Orkney Springs, Strasburg, Toms Brook and Woodstock.

Construction under consideration by the borrower includes a combination automatic central office and headquarters building at Edinburg, plus unattended automatic offices at Mt. Jackson, New Market, Strasburg, Toms Brook and Woodstock. The Orkney Springs community will be served from Mt. Jackson. Present plans include service without toll charge among all of its exchange areas, and between the New Market area and Timberville. Farmers Mutual expects to construct its own toll line between Edinburg and the other five exchanges, and to provide its own toll and operator services.

E. W. Newman is president of Farm-

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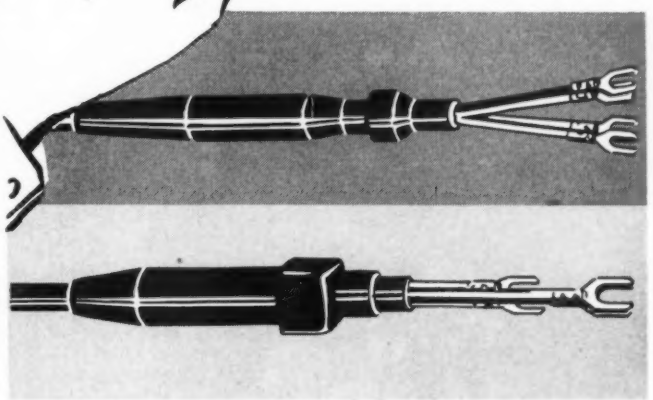

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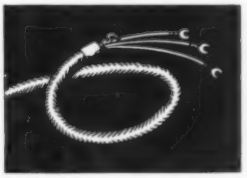

QUALITY CORDS FOR ALL MAKES AND TYPES OF TELEPHONE INSTRUMENTS

ers' Mutual and Warren B. French is manager of the system. The company was incorporated in 1902. Its ownership is widely held among subscribers, and it operates as a mutual association in some respects.

*

Meadow River Telephone Co., Rupert, W. Va.; $62,000, second loan (Sept. 27).

The borrower plans to use these funds, together with the first loan of $347,000 approved in June 1954, to provide automatic service for 905 farm families and other rural residents in Greenbrier County. Of these, 508 are families now without telephones. Facilities to be constructed by the borrower include an automatic central office at Rupert.

J. Rodney Graham is the company's president and manager.

*

The Delta County Cooperative Telephone Co., Paonia, Colo.; $1,360,000, first loan (Sept. 28). This is the largest REA telephone loan in Colorado.

The Delta county cooperative plans to use this loan to improve service for 2,229 existing subscribers and to furnish initial service to 494 rural subscribers. The existing subscribers are now served through the borrower's magneto exchanges at Cedaredge, Crawford, Eckert, Hotchkiss and Paonia.

Both the Mountain States Telephone & Telegraph Co., and the Delta County Cooperative Telephone Co. serve this part of western Colorado. Many subscribers have telephones of both systems in their houses. This is one of the few remaining areas in the country where there is duplicating telephone service. However, the two organizations have agreed to end the duplication as soon as construction proposed with REA loan funds is completed in the borrower's area. Under the terms of the agreement, each group will relinquish a portion of its area to the other, and sell to the other its outside plant in the relinquished area. In addition, Mountain States agrees to furnish toll connections for the cooperative and sell to it the existing Mountain States toll lines in the area.

Construction planned by the Delta county cooperative includes automatic central offices to replace five present exchanges. The expanded and modernized system will serve 2,723 rural subscribers in three counties.

Harry H. Adams is president of the cooperative and O. J. Stone is manager. The Delta county cooperative was organized in 1897 and has been providing service ever since.

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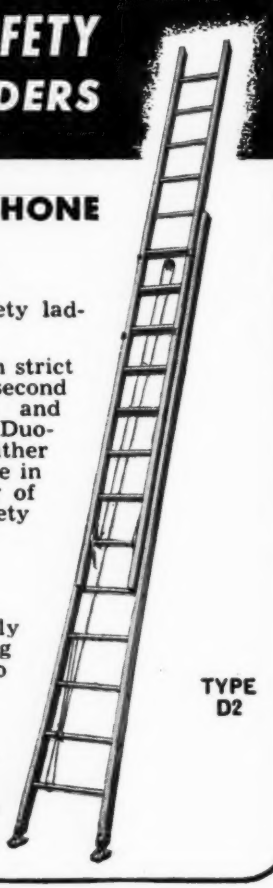

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TRANSMISSION TESTING

Continued from page 26

transmitted carrier as received from the equipment at the distant end, or it may be used with a variable frequency oscillator which will generate carrier frequencies.

Oscillators of this type customarily will supply 1,000 cycles as well as carrier frequencies, and some central offices use this one instrument for both voice frequency and carrier frequency tests.

As with other oscillators, the variable frequency kind must have a good degree of stability and accuracy for telephone company use. In order to tune over the wide range needed, the Wein bridge type of oscillator is frequently used. This is a resistance capacitance type and permits of wide adjustment, because it is easy to cut resistors in and out and vary the condensers to get the different frequencies. In order to get proper phase shift, a second stage of amplification is required. Stability of output voltage is achieved by using a thermally sensitive element in the feedback circuit.

Fig. 2.3 shows a simplified schematic of this type of oscillator. The two

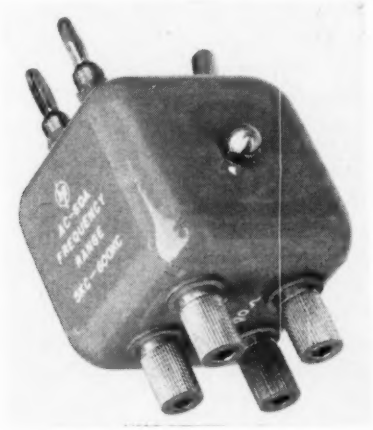
A variable frequency oscillator like this is made especially for telephone company use. It puts out both voice and carrier frequencies at several different amplitudes. It can be used for 1000-cycle tests as well as for carrier frequencies.—Photo, courtesy Hewlett-Packard Co.

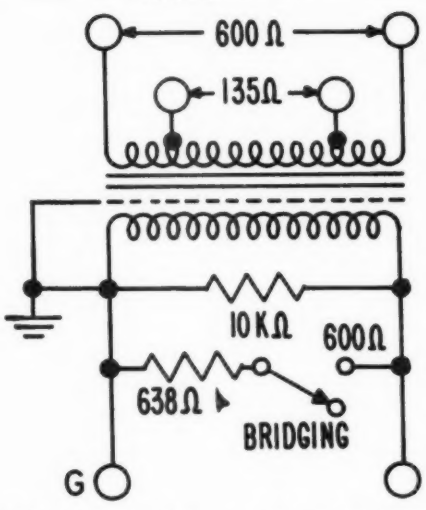
XUM

lamps are ordinary 10-watt globes. The feedback current which keeps the circuit oscillating goes through these. If the voltage starts to rise, which would mean the output would become too high, the extra current flowing through the lamps would cause them to get hot. When lamp bulbs get hot, their resistance increases. Thus, the lamp acts as a throttle and cuts down the feedback current if it starts to get too high.

Carrier Tests

In testing transmission on a carrier, due regard should be given the fact that the impedance of the wire line will be different than its rating at voice frequency. Cables which may be 600 ohms at voice can be 135 ohms at certain carrier frequencies. It should also be remembered that a vacuum tube voltmeter measures all voltages on the line, including noise voltages. To get an accurate reading on a single channel, the





This is a transformer which plugs into the terminals of a vacuum tube voltmeter. It converts the ground input of the meter to a metallic or "dry" circuit for use on telephone lines. A toggle switch changes it from a bridging instrument to a 600-ohm termination. It also has a 135-ohm input for carrier lines. Though rated at 5kc to 600kc, it is usable down to 1,000 cycles with a slight correction factor.—Hewlett-Packard Co. photo.

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reading must be taken after it passes through the filter. This reading could be affected if the filter were defective. The reading obtained should be compared with the record of the voltages obtained when the system was first installed, or when it was last tested when known to be in good working order. Due regard should be given any changes which might have been brought about by line temperature.

Again, as with voice frequency, transmission troubles can be located by taking measurements at different places. However, some calculations or allowances may have to be made if repeaters, regulators, slope adjustment devices, or frequency frogging methods are used in the system.

In addition to the measurements made at carrier frequencies on the line, voice frequency measurements may also be made on the circuit after it has been demodulated back to voice frequency. In such tests, which often are made in over-all line-up, the 1,000-cycle tone is put into the trunk before it reaches the carrier, and measured with a db meter after it comes out of the trunk at the other end.

In passing, it is perhaps well to note that a low reading should not always be corrected by cranking up the last potentiometer in the system, which is usually on the demodulator. This will raise the received volume level but also raise the noise. Carrier circuits which measure below par at voice frequency should also be tested at carrier frequency and the line troubles corrected first.

Carrier Frequency Voltmeter

An extremely useful instrument for carrier installations is the carrier frequency voltmeter. This is a vacuum tube voltmeter which is equipped with a tuning mechanism so that it may be tuned to measure one frequency and reject all others *(see Fig. 2.4)*. The circuit for this type of instrument resembles a super-heterodyne radio receiver with a db meter on it instead of a loudspeaker. Actually, it is just that, and it can be tuned to cover the frequency range used by telephone carrier systems. Such an instrument may also contain built in calibrating mechanism so that its accuracy can be checked from time to time.

In use, this instrument can be tuned exactly to the frequency of any carrier channel wanted, and it will measure the db level of that channel. In addition, it may be tuned in between channels or any place else in its range. By skillfully interpreting readings, it is possible to locate harmonics of lower channels on a system which are interfering with upper channels, or it may be possible to track down an interfering signal or noise from some other source, such as another carrier system or a nearby radio station.

This type of instrument is also useful for making slope or bulge readings on a carrier system. The carrier frequency voltmeter may be taken to each repeater point on a system and readings taken of each channel. By comparing readings, the section with the wrong transmission characteristic can be spotted, and the defective transposition, or the load coil somebody forgot to take out, can be found.

Each of the vacuum tube voltmeters described here is equipped for monitoring with a telephone receiver. That is, the amplifier can be used to amplify anything on a telephone line so that a repairman can identify it more easily. This can be of advantage when an interfering signal is not loud enough to be recognized but bad enough to be annoying.

Actually, noise measurements of a sort can be made with vacuum tube voltmeters. The regular noise measuring set used by telephone companies is the same kind of an instrument—an amplifier with a db meter hooked on to it. The difference is that the noise measuring set is "weighted." That is, it tests for noise that is within the range of the telephone instruments being used.

Even an excessive amount of noise would not bother anybody on a telephone line if the frequency were too high or too low to be heard. Fundamental interference from a 60-cycle power line would bother nobody if the telephone set would not reproduce 60 cycles.

The same is true in testing on carrier pairs. If noise is heard without being demodulated, it will not be a true indication of what the carrier will receive and deliver to the user. Also, noise at carrier frequency could not be heard by listening on the line, but would still cause trouble on the system. Of course, some troubles, like a grounded pair, could cause noise at both carrier and voice frequencies, and this must be remembered when making transmission tests.

Once a company obtains instruments like a vacuum tube voltmeter and a good variable frequency oscillator, there are other tests which can be made in the plant. Some of these other applications will be discussed in the next and last chapter in this series.

Iowa Company Raises Rates

New rates for patrons of the Iowa Continental Telephone Co., Grinnell, were announced recently by Everette Kahl, Iowa division manager.

Copperweld Line Wire

TRADE MARK

stays on the job!

Even when the weather is at its worst, you can depend on non-rusting Copperweld* Line Wire to give "service as usual" —safe, sure, uninterrupted. Its ability to stand up under the most severe operating conditions, year after year, is a matter of record. The test of time has proved its permanent high strength and its long service life at lowest annual cost. And, because of its excellent conductivity, Copperweld is the only long-span conductor suitable for all types of circuits—voice, signal and carrier.

Your request for engineering data will receive prompt attention.

*Trade Mark

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WIRE AND CABLE DIVISION *Glassport, Pa.*
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construction and maintenance DIGEST

- Happy anniversary
- Stubbornest anchor
- Button, button
- Easy dead-ends
- A lasting wire

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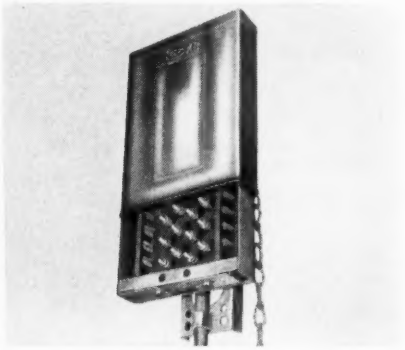
Two dividends are yours when you order supplies from Stromberg-Carlson. First, you get the protection of a double guarantee—ours and the maker's. This assures you of getting the finest products, backed by our 62-year reputation. Second, your support is used to further the art of telephony. We're knee-deep in this industry as a full-time job, not a side line, and your supply business plays a big part and helps us continue our research for new and better telephone equipment.

The Silver Anniversary Terminal

Time Tested, Time Proved. Yes, the past 25 years of experience has proved the Cook XB Cable Terminal is the best of its kind.



Unprotected XB Cable Terminals, available in 6-, 11-, 16-, and 26-pair sizes, with or without stub.

The features are: A patented Bakelite faceplate and fanning strips moulded in one piece; non-corroding everdur studs that cannot twist or turn; sturdy, reversible zinc hood for taking stub out top or bottom; patented weather guards at the drop wire opening, all combine to make this unit the outstanding unprotected terminal on the market.

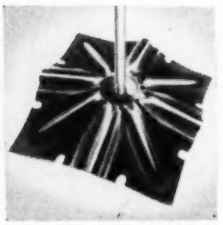
Hundreds of thousands of XB Terminals in use today attest to their dependability.

Best way to anchor guy wires

A guy-wire anchor has to do many things for you. It must hold the guy firmly in place, by getting a strong grip on the soil it's planted in.

It must be easy to install, and it must have plenty of underground surface to hold it in place.

8-Way anchor before installation.



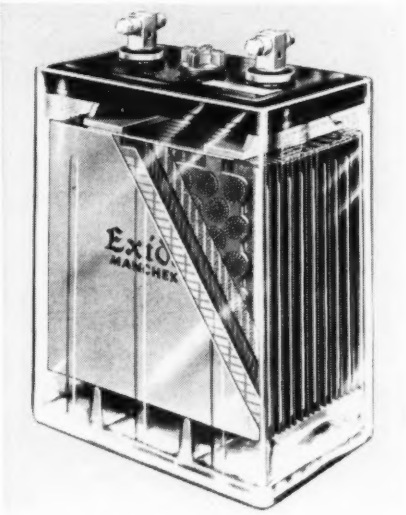
After expansion.

You can expand the Chance 8-Way expanding anchor with only eight or nine sharp blows. Its eight plates open to a full width that puts as much as 63% of the anchor under undisturbed earth. The guy load is distributed evenly over all of these blades, for maximum holding power.

There is no waste space between blades—when expanded, the anchor forms a complete pyramid-shaped square, providing a strong foothold. Sizes from 60 to 200 sq. in. in area.

Lead buttons mean lower costs

Only Exide Manchex Batteries have the positive plate with the buttons of corrugated lead tightly locked in the lead alloy grid several times more rigid than pure lead. Because of this outstanding design, the plates resist the mechanical strains bound to develop and retain their shape without growing or buckling. There is an ample reserve supply of pure lead which can be converted into active material as needed.



Special construction gives long life to Exide Manchex Batteries.

These and many other features combine to insure exceptionally long, trouble-free service.

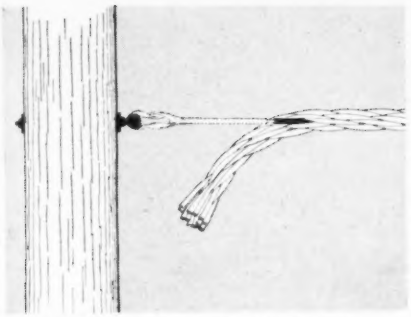
To be sure of top quality, specify Exide Manchex Batteries when you order through your Stromberg-Carlson representative.

These dead-ends need no bolts

Your most inexperienced lineman, using the Preformed Dead-End, can make dead-ends faster and easier than an old hand using old-fashioned dead-ends.

No bolts, no special tools are needed. You eliminate costly loops, and your dead-end exceeds the strength of the wire or cable, even under sudden impact. It never relaxes its grip.

XUM



Available in galvanized steel, copperweld, stainless steel and bronze.

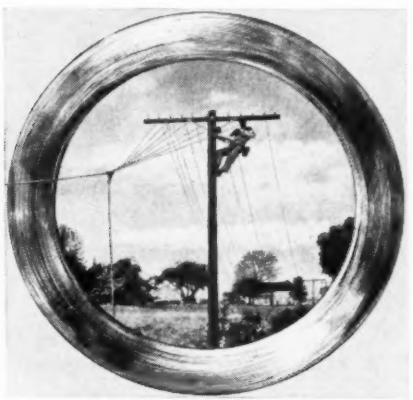
The Preformed Dead-End can be applied around an insulator, or inserted through thimble eye.

Available for self-supporting plastic cable, telephone line wires, rural distribution cable, and open wire.

This top performer brings you low-budget operation

If you'd like to reduce the cost of installing and maintaining telephone lines, may we suggest a rugged wire that staunchly defies wind, ice, and snow?

Copperweld Telephone Line Wire is known as a faithful friend, having wonderful transmission qualities and long, rust-resisting life. It lasts and lasts and lasts—saves you maintenance or replacement costs.



Copperweld Line Wire "talks better," and cuts your maintenance costs.

For short subscriber loops and secondary toll lines, we recommend .080"-30 E.H.S. and for toll lines and long subscriber loops, .104"-40 H.S.

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TRAVELING THROUGH EUROPE AND MIDDLE EAST

Continued from page 29

the German dogs everyone would be happy.

The Germans have very good telephone service and really make good use of it. It is said that 7 per cent of the West German population now have telephone service. They dial practically everywhere and make use of automatic ticketing. If a subscriber thinks that his bill is too high, he may rent a ticketer for a month to connect on his line in his office or residence and observe how the charges are made and computed. It is understood that this arrangement usually proves convincing.

One example of the power of the dial was cited where, due to an insufficient number of lines between two centers of population, calls handled on a manual basis were delayed two hours. The operators were removed and the trunk lines opened to subscribers dialing from each end. It was soon learned that the service was materially improved, more calls were completed, and a line could be obtained by anyone wishing to call—even during the periods of heaviest traffic—on the sixth or seventh dial attempt.

One surprising arrangement in Germany is that business concerns, for the most part, own their PBX systems and merely obtain trunk service from the Dutche Posts. Such an arrangement appears to prove satisfactory and perhaps accounts for the fact that many PBX features made use of in Europe are unknown in the United States. Moreover, this system is utilized to great advantage by the various automatic equipment manufacturers we visited as it permits experimentation and testing of new developments on their own working telephone systems.

The Germans have a vacuum gap arrestor block that can be used to replace the carbon blocks on a main frame protector. I also examined a ground rod in auger form which tapered from about 3 inches in diameter at the top to a point at the end. This auger has numerous holes drilled in the sides so that it can be filled with water when installed to keep the ground contact moist. They also use bare wire leads from the storage battery to the power board in small exchanges. These bare wire leads are supported in a manner similar to busbars. I also saw several women installers working on a PBX installation job. This caused me to wonder why we don't do likewise since we employ women to fabricate the equipment in our factories and the installation of a PBX is no more difficult.

In one exchange we observed a jack panel with various types of open-end plugs in place and inquired as to its use. I learned that it was used to place certain restrictions on the service. For example, if you do not want to receive calls over your telephone for a certain period of time, you can call the telephone company and a certain type of plug will be placed in the jack associated with the line to provide this restriction. Another type of plug will restrict originating calls; other plugs provide various types of restrictions or service controls.

Outdoor telephone booths are used quite extensively throughout Europe. Perhaps there are more of them in Germany than in the other countries we visited and the ones we noted were busy the greater part of the time. Here, the Dutche Post handles both the mails and communications. Many of these booths, in addition to having pay-telephones, house mail boxes and machines to purchase stamps when coins are dropped into the slot.

In the States we have had some difficulty with the heat emission of busy lamps when a considerable number of busy trunks are connected to a manual switchboard. The Germans have solved this problem by using a push button or a foot switch to bring the busy lamps on when an operator wants to set up a new trunk connection. They also use a vertical splice on the order of a pot head to connect several small cables to the larger cables in the vault. This is an ingenious arrangement which should save considerable labor on this usually difficult job.

While in Berlin, we spent a part of one evening in the famous Ballhaus Resi. This is a large restaurant on the order of a night club with a large dance floor in the center. There is a 250-line dial switching system enclosed in glass at one side of the entrance. A telephone is installed at each of the 250 tables with a number displayed so that it can be seen from a considerable distance. If you dial a number of a certain table, a light will flash at that table. In other words, if you see a girl who takes your fancy you can dial her number and ask her for a dance. It is as easy as that, and it is claimed that they never refuse.

Then, too, there is a pneumatic tube service that connects all tables. It is said that thousands of letters are posted each night from one visitor to

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another. One man at our table smoked a pipe so someone sent him a note asking: "Which do you enjoy more, your tobacco or your pipe?" The notes are, however, censored at a central point. There is no rowdyism in this place and everyone is orderly and, from every indication, it is a place to have an evening of good clean fun.

At another restaurant a member of our party went into the men's rest room and noticed a slot machine on the wall. He could not understand enough German to read the sign but noticed that it would operate on 20 pfennig and give him something. He dropped a coin in the slot and was promptly and thoroughly sprayed with cheap perfume.

When it came time to leave Berlin we proceeded to Tempelhof Air Base. This airport was started in 1937, and had not been completed at the end of the war. The arc shaped hangars are of steel construction, uniquely built to permit aircraft parking under a roof supported by large cantilever beams. The landing field contains 312 acres, bordered on one side by a concrete block apron 950 feet wide and 3,500 feet long.

At Tempelhof we also saw the end of this year's Kinderlift. This operation began in 1953 when a German agency asked the U. S. Air Force for help in transporting 1,000 needy and refugee children from Berlin to West Germany for vacations. The operation has since grown in size to this year's record of 3,192. Children are chosen by German Red Cross and other German welfare organizations.

We left Berlin on an air force courier plane for Rhine-Main Airport at Frankfurt. The next morning we caught the courier plane from there to Paris. We spent several days at a hotel in St. Germain in the outskirts of Paris. This is near Versailles where the armistice was signed in World War I. There are many things to see in Paris, including the Folies Bergere, which was quite a show. We also visited the Louvre Museum which should prove a paradise for all art lovers. Although we know very little about art, we were impressed by this wonderful exhibit. We even saw the original "Mona Lisa." This priceless painting was behind glass with a constant guard in attendance. Even then when anyone got too close, he was properly reprimanded by the guard in French—or, at any rate, that's how it sounded to us.

In our opinion, France is the most backward of all countries we visited. They all appear to be living in the past, for the present, and to hang with the future! There was never any soap

in the bathroom and the door knobs were always in the center of the doors. In Germany, a handle has replaced the door knob. We came back to our hotel one night after midnight and found the front gate of the grounds closed and locked. We pushed a button at the side of the gate for about 10 minutes and finally the night clerk came out and let us in. Their automobiles are all equipped with amber headlights and it is unlawful to use any other type. Horn blowing is taboo in downtown Paris and so almost everyone drives his car without lights at night and flashes them on when he wants someone to get out of the way. Take our word for it, the Paris taxi drivers are just as bad as they are reputed to be.

I did not get to see much in the way of communications in France. I did notice, however, the white insulators on brackets mounted close to the pole. NATO is also providing much new communications such as coaxial cable and microwave radio facilities.

There are a lot of metal and concrete poles used throughout Europe. The concrete poles are hollow and reinforced with small steel rods. Actually, they look very good and apparently are quite serviceable. We drove along a line for several miles in Italy which consisted of concrete poles, angle iron crossarms, steel pins and porcelain insulators. A total of four circuits were installed on each crossarm and they did not appear to be transposed.

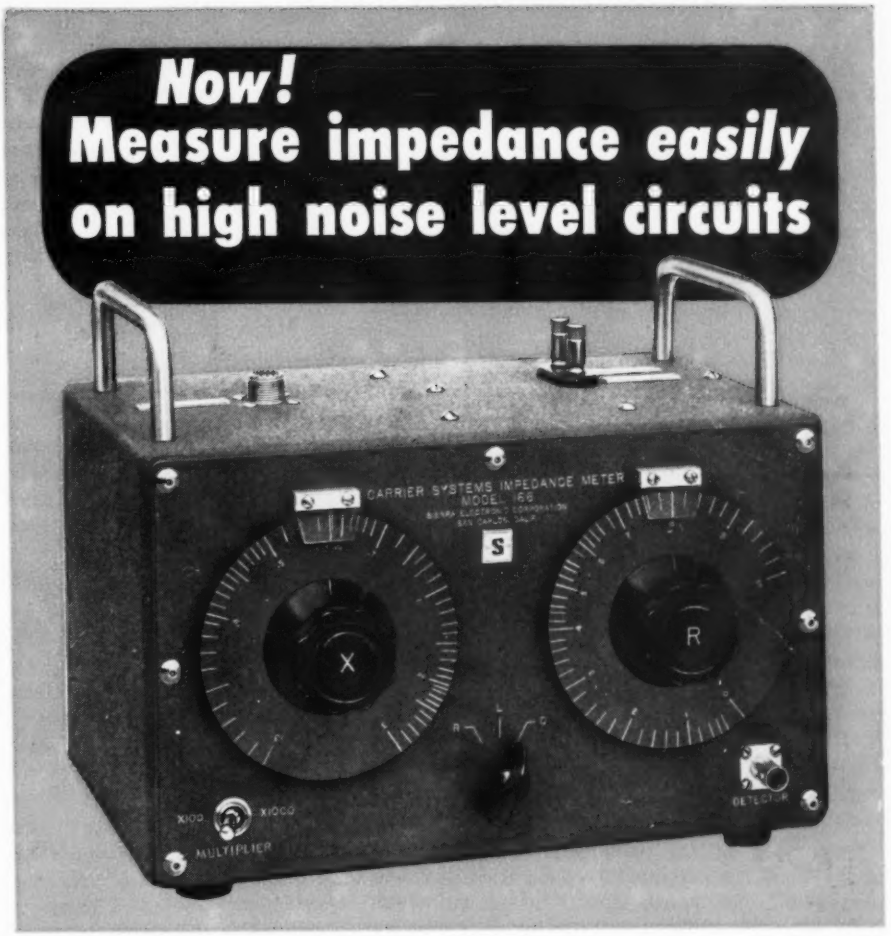
REA to Test Buried Wire For Rural Telephones

A field test of buried telephone wire which may cut the cost of extending rural telephone service was announced on Oct. 3 by the Rural Electrification Administration.

Four types of plastic-coated wire were to be "plowed under" on Oct. 11 and 12 to become part of the system of the Craw-Kan Telephone Cooperative Association, Inc., of Girard, Kan., an REA borrower.

Purpose of the experiment is to test a new buried wire manufactured specifically for REA and the test by the Plastic Wire & Cable Corp. of Jewett City, Conn. REA believes that if the wire proves out it can be marketed and put in place at a cost competitive with aerial wire for single circuit construction in many areas of the country. About 60 per cent of the pole line miles of REA telephone borrowers is in single circuit leads.

Buried plant, as an alternative to open wire construction, has long been an attraction for the telephone industry. The cost of wire and installation, however, has precluded its general use.



Sierra 166 Carrier Systems Impedance Meter

New Sierra Model 166 is specifically designed for measurements on high noise level power and telephone lines and circuits where conventional instruments are ineffective. Covering all frequencies from 30 kc to 300 kc, it can be used with signal sources ranging in output from 1/6 to 1600 voltamperes.

Model 166 is ideal for determining impedance vs. frequency characteristics, and its wide impedance range permits use (through series coupling capacitors) on "hot" lines. On low noise level laboratory circuits, the instrument measures impedance using a standard vacuum tube voltmeter as a detector. Under less ideal conditions, impedance may be measured conveniently by using a frequency selective voltmeter (such as Sierra Models 101B, 104 or 108) as the detector.

Brief specifications of new Model 166 are given here. Please write for complete data on Impedance Meter and Sierra Carrier Frequency Selective Voltmeters.

TENTATIVE SPECIFICATIONS — MODEL 166

Frequency Range:	30 kc to 300 kc
Inductive Reactance Range, X_L:	30 to 3000 ohms at 100 kc
At a given frequency, f_{kc}:	$X_L = \frac{(X \text{ dial reading})\ f_{kc}}{100}$
Capacitive Reactance Range, X_C:	30 to 3000 ohms at 100 kc
At a given frequency, f_{kc}:	$X_C = \frac{100\ (X \text{ dial reading})}{f_{kc}}$
Resistance Range, R:	0 to 1000 ohms
Accuracy:	±5% on impedance magnitude and phase angle
Maximum Signal Input:	1600 voltamperes, not exceeding 400 volts, or 4 amperes, whichever is larger.
Dimensions:	11⅛ inches wide, 8⅞ inches high and 8¼ inches deep, over all
Weight:	Approximately 8 lbs.

Specifications subject to change without notice.

sierra

Sales representatives in major cities

Sierra Electronic Corporation
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Manufacturers of Carrier Frequency Voltmeters, Directional Couplers, Wave Analyzers, Line Fault Analyzers, Wideband RF Transformers, Custom Radio Transmitters, VHF-UHF Detectors, Variable Impedance Wattmeters, Reflection Coefficient Meters, Calorimeters, Water Loads, Thermopiles, Ion Gauge and Ion Gauge Amplifiers, Phase Changers.

REA engineers will make evaluation tests from time to time and will exchange information with the borrower on a continuing basis to determine how resistant the wire samples are to rodents, insects, corrosion, and lightning. Burial will be below the frost line for the region. Most of the buried wire will run along highway and road shoulders. Subscriber service drops as well as all splices and terminals will be above ground in the Kansas test.

REA is furnishing to the Craw-Kan Telephone cooperative 15 miles of wire for this trial. There will be four different types of wire: (1) 2½ miles of 14 gauge Copperweld, unarmored (this is identical to a new type of rural distribution wire used in aerial construction); (2) 2½ miles of 17 gauge hard-drawn copper, unarmored, but provided with an outer vinyl sheath; (3) five miles of 14 gauge Copperweld, similar to type No. 1 but provided with an outer vinyl sheath; and (4) five miles of 17 gauge hard-drawn copper, with a bronze tape shield and an outer vinyl sheath. The primary insulation on all varieties is polyethylene.

Ownership of the wire will be retained by REA. The Craw-Kan cooperative will be responsible for labor costs connected with the installation. The Frank Horton Co., Lamar, Mo., has the contract to plow in the wire and will use a specially designed machine which digs a trench, lays the wire and covers it in a single operation. Managers of nearby telephone systems, telephone engineers and other interested persons were invited by Craw-Kan and REA officials to be on hand for the installation on Oct. 11 and 12.

Western REA Borrowers Hold Semiannual Meeting

On Sept. 7 and 8 the Western Association of REA Borrowers held their semiannual meeting in Portland, Ore., with five states represented and with approximately 100 in attendance from various telephone companies, engineering firms and suppliers.

The association was organized in 1954 for the purpose of promoting the general welfare of its members and the telephone industry. Membership was limited to companies, associations, mutuals, cooperatives and corporations directly engaged in or about to engage in the telephone business and who are bona fide borrowers from the Rural Electrification Administration.

The officers of the association are Glenn J. Stover of Mount Vernon, Wash., president; James Damon of Mount Vernon, Ore., secretary-treasurer; Richard Crowe of Dos Palos, Cal., vice president. Milton Larson of Lynden, Wash.; Henry Mumaw of Aberdeen, Wash.; Rodney Cummings of Philomath, Ore.; C. J. Lickleider of Elkton, Ore.; Harry Baker of Raymond, Cal., and Donald Dickson of Rupert, Idaho, are directors.

Mr. Stover stated that all members are urged to join and take an active part in their respective state telephone associations.

After registration and introductions the first day was spent on subjects of loan applications and accounting problems with Harold Clark, head of one section and Clark Phillipi of the operation and loan division of the Rural Electrification Administration leading the discussion. Richard Crowe acted as moderator.

On the second day, engineering, new products, plant protection, testing equipment, plant design and plant records were discussed, with Chester Gibbs of Colfax, Cal., acting as moderator for the morning session and Henry Mumaw handling the afternoon session. Don Housley, section engineer, James Eppes, Ray Ballard and William Stokesberry of the REA engineering section led the discussions.

The spring meeting is scheduled for Mar. 21 and 22, 1957, at Portland.

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Western Utilities Corp. Buys Thornhill Publishing

Chester H. Loveland, president of Western Utilities Corp., San Francisco, on Oct. 13 announced the acquisition by his company of the Thornhill Publishing Co., of Everett, Wash.

The publishing company has been producing telephone directories throughout the West for many years. George B. Thornhill, owner of the firm, will continue to be in charge of directory operations for the new organization. He has had 16 years experience in telephone directory publishing plus several years experience in advertising, printing, photoengraving and allied businesses.

Mr. Loveland stated that the publishing company will be operated in the future as a division of Western Utilities Corp.

New headquarters for the firm have been established in San Francisco with branch offices at Everett, Wash., and Brownwood, Tex.

Under Western Utilities control Thornhill will begin operations by publishing directories for 127 communities in nine Western states, including Washington, Oregon, Idaho, California, Utah, Texas, Arkansas, Louisiana and Oklahoma. Aggregate annual advertising billing will be more than one million dollars.

The company offers complete directory services, including sale of advertising, production, printing, paging and photoengraving.

West Coast Telephone Announces Four Promotions

Several new promotions in the general office and Everett district of West Coast Telephone Co., Everett, Wash., have been announced by Arthur W. Scripture, vice president and general commercial superintendent.

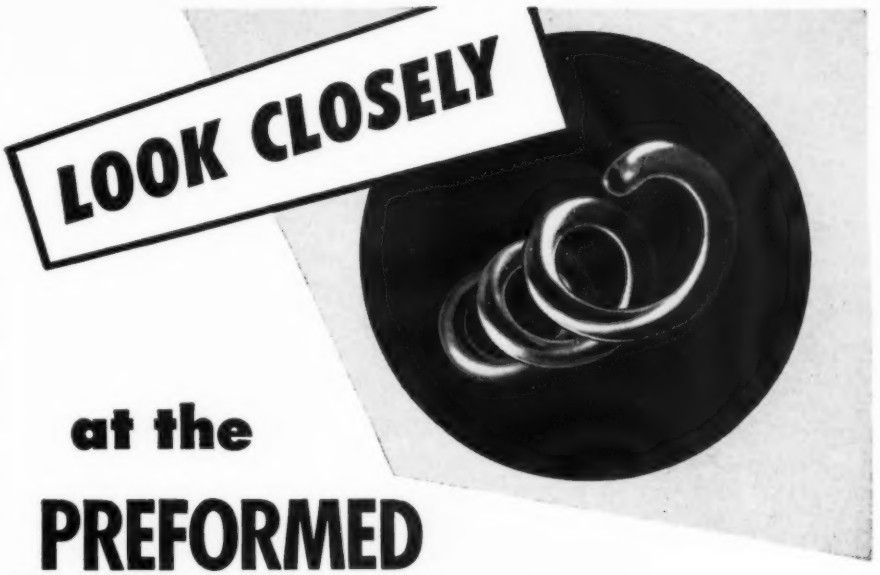
Marvin Winans will become sales supervisor, a newly created position with the company. Mr. Winans joined West Coast in February 1956 after 10 years telephone experience in California.

James M. Bricker, Everett division commercial supervisor, will succeed Winans as commercial engineer. John Gordon, Everett commercial representative, will replace Bricker and Glenn W. Larson, Everett collections supervisor, will succeed Gordon.

Holan Promotes John Kott To Post As Sales Manager

John Kott Jr. has been appointed sales manager for J. H. Holan Corp. 4100 West 150th St., Cleveland, O.

The new sales manager, formerly

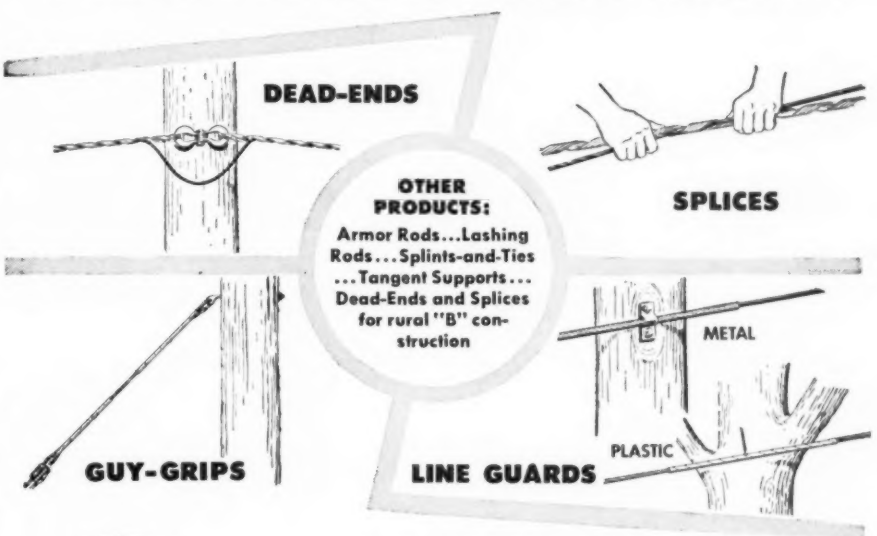


a major advance in line accessory fittings

The Preformed method of producing line accessories is an exclusive new development for the telephone industry. It incorporates the use of Preformed Rods—helically formed within exacting tolerances—to serve varied "fitting" functions all along the line. No more bolts—no compression tools—simplified construction. More than just something new, Preformed Products represent a better, faster and more economical way to *dead-end, splice, support,* or *protect* conductors and strands.

For more information on their exclusive advantages, consult your telephone distributor.

A COMPLETE LINE FOR THE TELEPHONE INDUSTRY...



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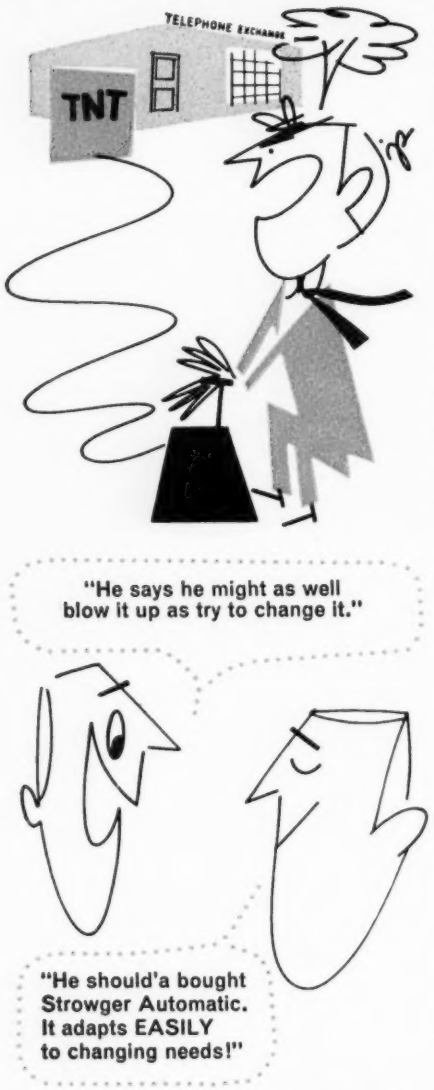
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GENERAL SYSTEM INDEPENDENT

JOHN KOTT JR.

assistant sales manager at Holan, worked in production, engineering and purchasing at American Coach and Body for 17 years before joining Holan in 1950. He attended Fenn College in Cleveland.

In his new position, Kott will supervise sales of utility bodies and associated power equipment for the J. H. Holan plant in Cleveland. Victor H. Warner, vice president, continues as general sales manager for the three Holan plants in the U. S.—Cleveland, O.; Phoenix, Ariz.; and Griffin, Ga.

Budelman Appoints Howlett To Manage Carrier Sales

Earl F. Howlett has been appointed manager of telephone carrier sales for the Budelman Radio Corp., Stamford,

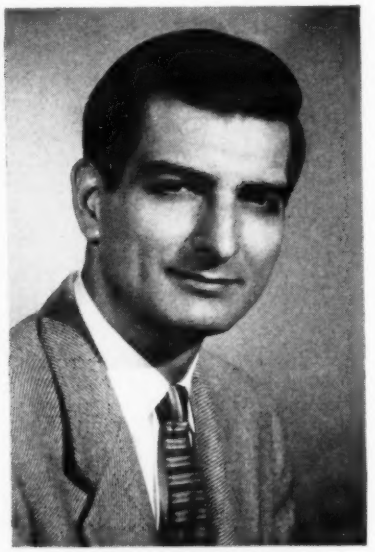
E. F. HOWLETT

Conn., manufacturers of telephone carrier and point-to-point communications equipment.

Mr. Howlett was formerly transmission engineer for the Rural Electrification Administration and has been actively associated with the Independent telephone industry for the past 15 years.

Blaw-Knox Tower Division Names Roscoe to Sales Post

William S. Roscoe, who has been associated with the tower department of the Blaw-Knox Co., Pittsburgh, for 16



W. S. ROSCOE

years has been named assistant sales manager of the department, A. H. Jackson, vice president and general man-

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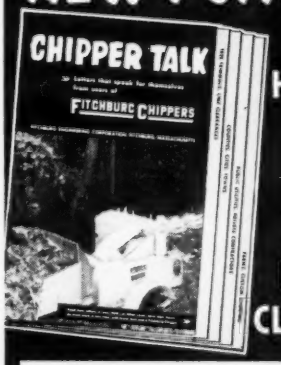

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ager of the Blaw-Knox Equipment Division announced.

In his new position he will be concerned with microwave tower sales in all 48 states, Robert A. Troman, sales manager said. Mr. Roscoe has been particularly active in this field during the last three years due to the development of microwave telephony.

Mr. Roscoe, a member of the United States Independent Telephone Association, began his education at California State Teachers College, and continued his studies in engineering at Penn State University and Carnegie Institute of Technology.

Simultaneous with this announcement, Mr. Jackson appointed Harry T. Needham assistant sales manager of the same department. Mr. Needham primarily will handle sales of parabolic reflector antenna systems for scatter propagation, a new field for Blaw-Knox.

STATEMENT OF OWNERSHIP

Statement required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233), showing the ownership, management and circulation of TELEPHONY, published weekly at Chicago, Ill., for October 1, 1956.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Telephony Publishing Corp., 608 S. Dearborn St., Chicago 5, Ill.; editor, Ralph C. Reno, 608 S. Dearborn St., Chicago 5, Ill.; managing editor, Dan S. Fargo, 608 S. Dearborn St., Chicago 5, Ill., and business manager, H. D. Fargo, Jr., 608 S. Dearborn St., Chicago 5, Ill.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as those of each individual member, must be given.)

Telephony Publishing Corp., 608 S. Dearborn St., Chicago 5, Ill.; H. D. Fargo, 608 S. Dearborn St., Chicago 5, Ill.; H. D. Fargo, Jr., 608 S. Dearborn St., Chicago 5, Ill.; Ralph C. Reno, 608 S. Dearborn St., Chicago 5, Ill.; A. J. Stults, 608 S. Dearborn St., Chicago 5, Ill., and Dan S. Fargo, 608 S. Dearborn St., Chicago 5, Ill.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: 10,601.

RALPH C. RENO.

Sworn to and subscribed before me this 17th day of September, 1956.

M. TERI SMITH.

(My commission expires January 10, 1959.)

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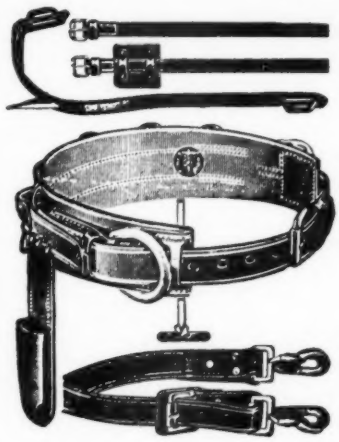

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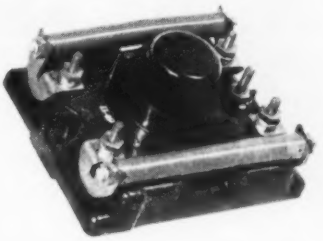

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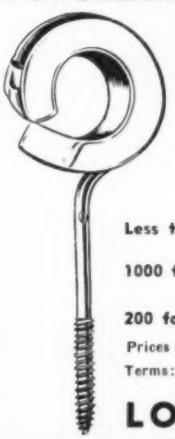

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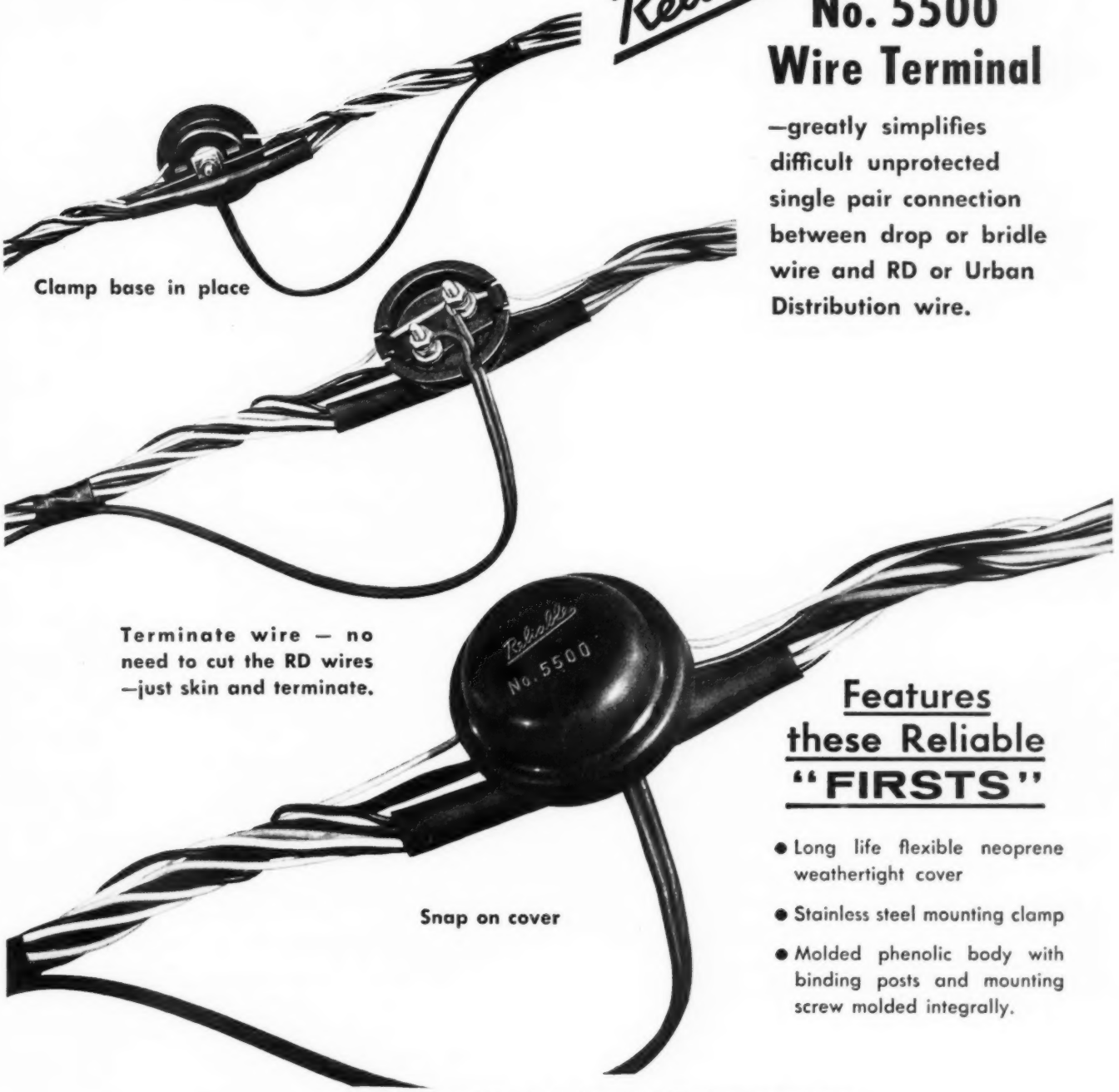

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